

1997

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ACADEMIC ACHIEVEMENT AND SELF-ESTEEM IN CHILDREN  
AND ADOLESCENTS WITH MODERATE VISUAL IMPAIRMENT

by

Anne-Marie Drapeau

M. A., Université de Moncton, 1977

A Dissertation  
Submitted to the Faculty of Graduate Studies and Research  
Through the Department of Psychology  
in Partial Fulfilment of the  
Requirements for the Degree  
of Doctor of Philosophy at the  
University of Windsor

Windsor, Ontario, Canada  
1996



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## ABSTRACT

Measures of intellectual functioning, academic achievement, and self-esteem were administered to a group of children and adolescents with moderate visual impairment (distance visual acuity from 20/70 up to, but not including, 20/200). Children with moderate visual impairment (ages 9 to 16) were divided according to the presence or absence of additional handicaps (i.e., hormonal imbalance, motor impairment, seizures). The measures included 5 subtests of the Wechsler Intelligence Scale for Children-III (WISC-III), 4 subtests of the Wechsler Individual Achievement Test (WIAT), the Word Attack subtest of the Woodcock Reading Mastery Tests-Revised, and the Piers-Harris Self-Concept for Children. Results were compared to the norms accumulated on the standardization sample for each measure. The overall intellectual level of the group with moderate visual impairment without other handicaps (MVI group) was within the average range. However, the overall mean academic score was significantly lower than the mean intellectual score for this group. Additionally, 48% of the MVI group obtained scores on one or more of the WIAT subtests that were significantly lower than expected from their WISC-III total score suggesting academic delays. In addition to SES, scores on Digit Span and Word Attack differentiated children with academic delays from those with no delays in the MVI

group. However, both the intellectual and academic levels for the group with moderate visual impairment with other handicaps (MVI+ group) were in the borderline range. In the area of self-esteem, children in both groups reported feeling good about themselves. However, they did report lower levels of perceived peer acceptance compared to levels of perceived competence in other areas. For a substantial number of children, the presence of a visual impairment was a significant component of their life experience but their interests and concerns were generally similar to those of children with normal vision. In addition to increasing our knowledge about the population of concern, the present study elucidated further the impact of reduced vision on specific areas of functioning.



## ACKNOWLEDGEMENTS

I would like to thank my Chairperson, Dr. Julie Hakim-Larson, for her support, enthusiasm, and thoughtful feedback of this research. Julie has remained approachable throughout the various stages of this project, making herself available even when her own schedule was hectic. Her input is greatly appreciated.

I am also grateful to the other members of my committee, Drs. Kathryn Lafreniere, Ann McCabe, and Larry Morton for their time and thought-provoking comments and questions. I would also like to thank the external examiner, Dr. Anne Bigelow, for her feedback on my study. In addition, Dr. Bigelow came from Nova Scotia for a weekend in Windsor to be part of the defense. The input from all committee members allowed the defense at times to take the form of a stimulating discussion, allowing me to forget for a while the reason why we were all meeting in the Tower.

This research was supported through grants from the Ross Purse Fellowship from the Canadian National Institute for the Blind and from the Trust Fund of the APSEA-Resource Centre for the Visually Impaired. I am extremely thankful for this support which allowed me to travel to various parts of Ontario and the Maritime Provinces to collect the data.

I would like to thank Mr. Dan Harmer, past director of the APSEA-RCVI, and Dr. Ann MacCuspie, present director of the APSEA-RCVI, for their support and encouragement through

this project. I would also like to offer thanks to the various professionals (ophthalmologists, optometrists, teachers and consultants in the area of visual impairment) who helped me recruit the participants. A very special thank you is extended to the children and their parents who so graciously volunteered their time and made this project possible. In addition, thanks are extended to individuals who offered assistance in the statistical analysis of the data: Paul Pilon, Tara Szuszkiewicz, and Dr. Glenn Schellenberg.

Although they are mentioned last, my family deserves and gets my unending appreciation. My parents, my sisters, and my brothers were tremendously supportive through the years. Their faith in me sustained me through thick and thin. The successful completion of this project reflects as much on them as on me.

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## CHAPTER I

### INTRODUCTION

Vision has a qualitative impact on the child's concept of the world, and on his/her perception of space and objects within it. Humphreys and Bruce (1989) outlined the role that vision plays in day to day functioning:

Vision enables us to perceive a world composed of meaningful objects and events. It enables us to track those events as they take place in front of our eyes. It enables us to read. It provides accurate spatial information for actions such as reaching for, or avoiding objects. It provides colour and texture that can help to camouflage objects against their background, and so forth.

(p. 1)

Information obtained through vision is combined with data available through other senses to form a personal and socially shared understanding of the self and the world. Total blindness has a tremendous impact on that understanding and the pervasiveness of its effect has been the topic of discussion by philosophers and others since Descartes (Wiesel, 1982) and the focus of a number of research studies (Tillman, 1967; see Warren, 1984, for a summary of available literature on the impact of blindness

on development). But the vast majority of children identified as visually impaired have some degree of vision (Genensky, 1978; Robinson, Jan, & Kinnis, 1987) and the psychological status of these children, particularly the ones who have been identified as moderately visually impaired, is relatively unknown. Warren (1994) emphasized the need for studies to clarify the impact of partial vision on various aspects of development.

Ammerman, Van Hasselt, and Hersen (1991) noted that the psychological functioning of children and adolescents who are visually impaired has received more clinical and research attention in the last few years than previously. They attributed the change to three factors. First, the number of children and adolescents who present with a visual impairment in the general population is actually substantial. Second, the majority of children and adolescents who are visually impaired have been attending public schools rather than specialized schools or residential settings since about 1975, bringing these children to the attention of service providers and professionals who have had little experience in working with this population. Finally, a number of studies have revealed that youths who are visually impaired may be at risk for experiencing difficulties with social and emotional adaptation (Ammerman et al., 1991).

While a number of well designed studies looking at the



social development of adolescents who are severely visually impaired have been conducted (e.g., Ammerman, Van Hasselt, & Hersen, 1986; Van Hasselt, Hersen, & Kazdin, 1985a; Van Hasselt, Kazdin, Hersen, Simon, & Mastantuono, 1985b), little rigorous research has been done to gather information in the area of learning (Daugherty & Moran, 1982), or cognition (Groenveld & Jan, 1992) in the population with some residual vision.

Moderate visual impairment (MVI) confers an in-between position to the child. Children and adolescents with MVI are not as different as the children who are blind or as visually limited as the children with a severe visual impairment but they are not quite the same as children with normal vision. Some adaptations may be necessary in school. For example, the child may have to sit at the front of the class to see the board, use dark-lined paper, or use a machine that magnifies print. But these adaptations are not as extensive as for the children who are blind and have to have material put in tactile form including braille. Daugherty and Moran (1982) noted that children who are partially sighted were generally offered the same academic curriculum as children with normal sight, with different materials, equipment, and teaching devices added when deemed necessary. But their own research revealed that many students with moderate visual impairment were functioning as chronic underachievers and required specific educational

intervention in the areas of reading, mathematics, language skills, and perceptual-motor functioning.

Within this same population, low self-esteem may often be a problem. Tuttle (1984) suggested that individuals with low vision, whether moderately or severely impaired, experienced increased difficulty achieving self-acceptance compared to either the fully sighted or the totally blind. Socially, the child with MVI may experience some small but significant differences between self and others. These may include physical distinctions that include eyes that look slightly different or having to wear thick glasses. The child may be embarrassed because of an inability to easily recognize a friend from a distance or to play ball as well as the others because the ball is not seen soon enough as it approaches. There may be legal repercussions, including not being able to get a driver's licence and drive oneself to school like so many other peers in high school. Jan, Freeman, and Scott (1977) indicated that more frequent incidents of teasing or hostility were described to them by children with partial vision (20/70 to 20/200) than by the children who were totally blind. "These children frequently reported to us that they were tripped, harassed, and had to suffer the indignity of frequent informal visual testing by other children who were sceptical of their status" (p. 203). Jan, Freeman, and Scott (1977) speculated that pity experienced by the sighted population for individuals who

are totally blind did not extend to children who had some remaining vision.

In addition, sociometric studies (Karnes & Wollersheim, 1963; MacCuspie, 1990) have revealed that children with a visual impairment have low peer status. They were chosen significantly less often than others not only for activities where vision clearly played a role (e.g., going to a movie, playing outdoors, watching a ball game) but also for activities where vision would not be expected to be as important (e.g., listening to records) (Karnes & Wollersheim, 1963). They were consistently rated as unpopular by their classmates and were observed to associate only with unpopular children during free play at school (MacCuspie, 1990).

The somewhat ambivalent position conferred by MVI is evident also in the difference in service delivery to the children and adolescents in different areas. Across Canada, the Canadian National Institute for the Blind registers individuals with vision from 20/70 and worse. Such a registration allows the children and their families to take advantage of the benefits available through that organization. However, the Departments of Education in various provinces have individual standards for delivery of services. For example, in the Maritime Provinces (New Brunswick, Nova Scotia, and Prince Edward Island), where service delivery is centralized through the Atlantic

Provinces Special Education Authority (APSEA) - Resource Centre for the Visually Impaired, services are made available to all children and adolescents with visual acuity from 20/70 or worse. On the other hand, in Ontario, the Department of Education makes funds available primarily for children/adolescents who use braille or have the potential to become braille users. It is left to the discretion of each individual school board to determine whether or not and to what extent services will be offered to children who have restricted vision but can read print (D. Borbeau, Special Education Coordinator, Essex County Roman Catholic Board of Education, personal communication, June 29, 1994).

The aim of the present project was to develop a picture of the intellectual, academic, and self-esteem characteristics of children and adolescents with moderate visual impairment. To achieve such a picture, children and adolescents who presented with additional handicaps, such as motor impairments, and/or seizure disorder, were not excluded, but rather formed a separate group. Such groupings would allow a comparison of results of children who were moderately visually impaired with and without other handicaps, would increase the knowledge base of the population of interest, and would allow a greater understanding of their specific needs if, in effect, they were different from the needs of the population with normal sight.

In the sections that follow, information will be presented on the terminology associated with visual impairment and on the prevalence rates available for the population with various degrees of visual loss. It should be noted that the terms "moderate visual impairment" and "moderate low vision" are considered synonymous and will be used interchangeably. A summary of various areas of relevant research will then be presented. A review of studies that have looked at various areas of functioning in children/adolescents with MVI will follow. A summary and critique of the literature outlined will be offered and will be followed by a rationale for the present study.

#### Terminology and Prevalence Rates

Visual status can be perceived along a continuum extending from normal vision to total blindness (Tuttle, 1984). Visual acuity is usually determined by an eye specialist using the Snellen letter chart and is expressed as a numerical notation (Ward, 1986). Normal vision refers to an acuity reading of 20/20 and visual fields covering 160 to 180 degrees. Partial or moderate visual impairment is defined as vision in the range between 20/70 to (but not including) 20/200, measured with best correction offered through contact or spectacle lenses. An acuity reading of 20/70 would suggest that the individual can see at a distance of twenty feet what a person with normal acuity (20/20) can see at seventy feet (Ward, 1986). The numerical

notation or ratio can be transformed mathematically into decimal form; for example, 20/70 becomes 0.29 (20 divided by 70 equals 0.29). Severe visual impairment or legal blindness is quantitatively expressed as visual acuity for distance with best correction of 20/200 (0.10) or less, or as a visual field reduced to 20 degrees or less. This definition for "legal blindness" was established by the United States Social Security Act of 1935 to identify older individuals needing additional benefits and is still in use both in the United States (Van Hasselt & Sisson, 1987) and Canada (Jan, Freeman, & Scott, 1977). The World Health Organization (WHO, 1980) offered similar guidelines under the category of ocular impairments, with the exception that visual acuity in the range of 20/70 to (but not including) 20/200 was identified as moderate low vision while vision between 20/200 and (but not including) 20/400 was labelled severe low vision. The WHO (Best & Corn, 1993) recently amended the guidelines for low vision to include visual acuity 20/60 or less, although guidelines of eligibility for services remain at 20/70. Terminology associated with visual impairment is outlined in Table 1.

While the above guidelines appear simple and straightforward, the actual visual functioning of an individual at any given moment is affected by a combination of factors, including physical status, emotional/motivational aspects, as well as environmental

Table 1

Terminology for Impairments of Visual Acuity<sup>a</sup>

Category	Degree of impairment	Visual acuity
NORMAL VISION	None	20/60 or better
LOW VISION	Moderate	20/70 to (but not including) 20/200
	Severe	20/200 to (but not including) 20/400
BLINDNESS	Profound	20/400 to (but not including) light perception only
	Near total	light perception only
	Total	no light perception

<sup>a</sup>Adapted from the World Health Organization, 1980.

characteristics such as size of the object to be seen, lighting, presence of glare, contrast, and other factors (Morse, 1983). In the standardized setting of a vision testing centre, acuity measurements have been found to vary depending on the specific measures used, and even when using letters of the alphabet, each letter has not been found to be of uniform identification difficulty (Ferris, Kasso, Bresnick, & Bailey, 1982). In addition, it is important to remember that there are fluctuations in visual acuity that occur naturally (K. McMain, Eye Clinic, Izaak Walton Killam Hospital for Children, Halifax, personal communication, June 22, 1995).

Reduced vision may be the result of a number of conditions, some of which originate in the prenatal period, during the birth process, or as the child matures (Ward, 1986). Within the school age population, eye disorders as a result of prenatal influences have been found to be the most prevalent and include congenital anomalies such as albinism, cataracts, and glaucoma as well as the absence of certain eye structures (e.g., the iris). Other conditions observed in children are optic nerve atrophy, retinopathy of prematurity, and disorders as a sequelae to a number of infectious diseases (Ward, 1986).

Information on actual numbers of children who are moderately visually impaired is rather limited. Prevalence rates on legal blindness are more available but do



fluctuate, depending on the specific definition of legal blindness adopted by the organization collecting the data (Kirchner, 1988). Legal blindness may be defined in one of the following ways: (a) distance vision of 20/200 measured by tests of visual acuity or restricted field of vision; (b) near vision which does not permit reading regular size newsprint; or (c) self-perceived restrictions in fulfilling one's social role as a student, homemaker, or employee (Kirchner, 1988).

In 1983, the American Printing House for the Blind reported that 0.1% of school-aged children in the United States were registered with that organization as legally blind but this prevalence rate did not include children with MVI (J.B. Chase, 1986). In Canada, the Council of Ministers reported that 0.06% of the school-age population and 0.4% of children in special-education programs presented with a visual impairment (Winzer, 1987). While completing the 1991 Statistics Canada's Health and Activity Limitation Survey, 0.48% of individuals between the ages of 15 and 19 years of age reported having difficulty seeing (Canadian Institute of Child Health, 1994). The latest information from the WHO suggests a rate of 0.1 per 1000 children in North America and Europe who present with low vision (20/70 to 20/400) (Best & Corn, 1993).

Kirchner (1988) estimated that there were at least as many children with MVI as children who were legally blind

but cautioned that such an estimate was rather conservative. There may actually be as many as five times more children in the 20/70 to (but not including) 20/200 range as there are in the 20/200 or poorer category (Kirchner, 1988).

Irrespective of prevalence rates, the impact of vision and of its absence on development and functioning is perceived to be substantial and has been the subject of much research.

### Theoretical Background and Conceptual Framework

Studies have looked at how visual stimuli are perceived, processed, and interpreted in the population with normal vision (Humphreys & Bruce, 1989), and over the years, theories have been proposed to account for the data accumulated (Bruce & Green, 1990; Leahey, 1987; Maccoby, 1964). The anatomical foundation (structural and neural) of the visual system has been researched with animals (W.G. Chase, 1986; Kosslyn & Koenig, 1992; O'Keefe & Nadel, 1978; Ungerleider & Mishkin, 1982; Zeki & Shipp, 1988). The pre- and post-natal development of the anatomical and perceptual aspects of the visual system has been and continues to be the topic of research (Banks & Salapatek, 1983). From this research, it has been gleaned that injury or disruption in development at any point along the visual system may lead to visual impairment, the form and extent of which will depend on the role of the particular structure that is affected and the pervasiveness of the structural change (Ward, 1986).

The effect of monocular and binocular lack of patterned

visual stimulation on functioning (Hyvarinen, Hyvarinen, & Linnankoski, 1981; Wiesel, 1982) and on anatomical brain structures (Hyvarinen et al., 1981) has been studied experimentally in cats and monkeys. In humans, the equivalency of monocular and binocular visual deprivation is observed in children with amblyopia and with cataracts. Wiesel (1982) reported that clinical observations with these children would suggest that the vulnerability to visual deprivation may exist within the first year of life and this vulnerability becomes less with age, particularly after age five to 10 years.

A separate line of study has focused on the performance of individuals who are totally blind. Within this population, differences have often been found between individuals blind from birth (i.e., congenitally blind) and those who became blind later in life (i.e., adventitiously blind). A number of theories (the visual organization theory, the motor organization theory, and the general theory of sensory compensation) have been proposed to explain the difference.

The visual organization theory proposed by Warren (1974) advocated that the sense of vision offers a frame of reference for incorporating spatial information made available through other senses. Warren based his theory on research data that showed that the functioning of other sense modalities in a person blind from birth was less

efficient than the sensory functioning of sighted individuals or individuals who have lost their vision later in life. A number of studies (McLinden, 1988; Talbot, 1992) have offered some support for this theory although that support was not completely unmitigated. In his meta-analysis of studies measuring the understanding of spatial relationships, McLinden (1988) noted that some individuals with early onset blindness (23%) performed as well as individuals with normal vision and 27% did as well as the group with later-occurring blindness. Consistent with the visual organization theory, Talbot (1992) found that children with a severe visual impairment (20/160 or worse) were less proficient at tactile performance tasks than children with a mild/moderate visual loss or the normally sighted (control) group. On the other hand, the better performance of children with mild/moderate (20/40 to but not including 20/160) visual impairment, compared to the control group, on a number of tactile tasks was not consistent with Warren's theory. Talbot questioned whether the children with a mild/moderate visual impairment learned to rely on their tactual sense more while maintaining the primacy of the visual frame of reference on all sense modalities. The poorer performance of sighted children may have reflected a lack of practice in using the tactual sense. There were also no significant differences between children with visual impairment (mild/moderate and severe) and without impairment

on visual and tactile route-finding tasks which involve spatial orientation skills, a finding also inconsistent with the visual organization theory.

Jones (1975) noted that many studies revealed that individuals who were blind from birth did develop skills in spatial relations but at a slower rate than their counterparts with normal vision. He proposed the motor organization theory to explain such a delay as a result of restricted experience with voluntary movement in infants and young children without vision. Jones' theory has received less attention in the literature than Warren's. For the current study review, no article was located describing research that attempted to separate the impact of lack of vision and restricted motility.

Another theoretical perspective, the general theory of sensory compensation (Talbot, 1992), emphasized that when one sense modality does not function as it should, the other senses become more highly developed as a result of structural cortical changes or as a result of increased attention or practice (experience) effects (Miller, 1992). Similarly, Millar (1994) summarized research data as indicating that all sense modalities provide "complimentary, convergent and overlapping information" (p. 14) and that one sense modality (vision) was not necessarily more important than the others in spatial coding. In the absence of one kind of input, other sense modalities become more prominent.

She called her theory Convergent Active Processing in Interrelated Networks (CAPIN).

While studies with animals provided evidence for actual changes in cortical organization (Hyvarinen et al., 1981; Miller, 1992), Rapin (1979) and Jan et al. (1977) emphasized the importance of experience in sensory compensation. Talbot (1992) obtained mixed results: the better performance of children with mild/moderate visual impairment compared to sighted children on some tactile tasks was found to be consistent with the sensory compensation theory while the poorer performance of children with severe visual impairment compared to both other groups (sighted and mild/moderate low vision) was inconsistent with the theory. Miller (1992), looking at auditory processing, concluded that individuals who were more profoundly congenitally impaired performed better than either individuals with normal vision or ones who were partially sighted. The better performance was not observed on simple tasks (e.g., "detecting bursts of noise", "discriminating differences in loudness") but only on more complex tasks which required sensitivity to variations in sound patterns (e.g., "frequency discrimination of sounds", "discrimination of pitch patterns", "identifying unfamiliar voices across several array lengths") and on the Digit Span subtest of the Wechsler Scales. Additionally, the group that was partially sighted performed less well than the other two groups, prompting Miller to suggest that the

occurrence of residual functioning might interfere with maximal reorganization of remaining faculties and structures.

Looking at the available literature, the status of the visual organization theory, the motor organization theory, and the theory of sensory compensation (or the Convergent Active Processing in Interrelated Networks) remains equivocal. Studies have produced contradictory results. Talbot (1992) emphasized the need for further studies to clarify the functional level of other sense modalities in children with various levels of visual impairment and with blindness and to determine how the functional level may change over time as the stages of development unfold from childhood to adulthood. Such an approach may reveal extensive variability in functioning within the various groups divided by degree of visual impairment and by blindness. This variability may prove to be an important reason why research results have often been at odds with each other. Greater attention to the individual composition of groups would appear to be a necessity for future research.

The research studies summarized above have increased greatly our understanding of both the architecture and functional roles of brain structures. But these studies have tended to focus on visual systems that either function normally or are totally non-functioning. But this all-or-

none perspective has not shed light on the impact of various degrees of reduced vision on areas of higher cognitive activities in human beings, such as concept formation, perception, academic achievement, or self-concept. The following sections will present information on a number of factors that increase the variability existing within the population with MVI. Summaries of studies that have addressed the impact of moderate visual impairment on children's functioning, specifically in the area of intellectual and academic functioning, as well as self-esteem will then be outlined.

#### Factors increasing the Variability within the Population with MVI

Before looking at the available literature on cognitive functioning, a number of important factors relevant to the population of interest must be considered, the first being the impact of prior visual experience (Warren, 1974). Within the visually impaired and blind population, there are a number of individuals who have experienced a decrease in visual acuity, whether going from normal to decreased vision, or going from normal/slightly decreased to totally blind.

Warren (1974) summarized research that compared the functioning of individuals who became blind early in life (congenital) to those who became blind later (adventitious). Various studies used different cut-off ages ranging from



zero to 5 years to delineate the two groups. Warren (1994) recommended that individuals who were blind from birth or before the age of 2 be considered congenitally blind, while those who became blind after age 2 be considered adventitiously blind. Millar (1994) used a cut-off of one year instead. Generally, studies revealed that individuals who were adventitiously blind performed better on tasks requiring tactile form discrimination, finger maze learning, as well as localization of auditory and tactile targets (cross-modal tasks). In addition, such individuals who became blind later in life reported the use of more visual imagery and of concepts of spatial relations than congenitally blind individuals. Contradictory results were found when the ability to move in the environment (extended space) was measured (Warren, 1974). Additionally, Marmor (1977) compared the performance of individuals identified as early-blinded to others later-blinded on a visualization task. Results indicated that individuals identified as early-blinded (before the age of one) were slower in responding and made more errors compared to individuals identified as later-blinded (between the ages of 6 and 30).

Conversely, Hull and Mason (1995) found that simple memory capacity (repeating digits) was greater for individuals who were congenitally blind than for individuals who were adventitiously blind and for those with some remaining vision.

While similar data for the population with moderate visual impairment were not found, it is evident that there is a need to obtain information on prior as well as present level of vision. Recognizing that the population that has experienced a significant change in visual acuity may present different patterns of functioning and require different forms of intervention, most of the studies summarized in the following sections have restricted their population to include only children with congenital visual impairments.

The recruitment location of the participants is a second factor that must also be considered when looking at the available literature. The question arises as to whether the children studied were students from residential schools, public schools, or a combination of both. Since about 1974, most children with a visual impairment have attended public schools (Ammerman et al., 1991). Van Hasselt, Kazdin, and Hersen (1986) drew attention to the possible differences between children who attend school in a residential setting and those who attend a public school and cautioned against generalizing information obtained from one to the other. The need for a specialized placement may be the result of early adjustment problems and/or poor family situations. The maladaptive behaviours may also be the result of living away from home in a residential setting (Van Hasselt et al., 1986). In addition, a number of children may attend school

in a residential setting if their home community does not offer the specialized educational opportunities that are necessary as a result of a severe visual impairment. Looking at the available literature, it is therefore necessary to keep in mind the possible effect of early or later visual impairment and/or the experience of living in a residential setting.

### Review of Relevant Empirical Research

The assessment of intelligence in children in general has a long history which has been marked by controversies. Polemics have surfaced around a number of issues: theories of what intelligence actually is; what is measured by the available intelligence tests; their role in the classification of children; and the possible existence of bias within the measures directed at minorities. Detailed discussions of these issues can be found in Anastasi (1983), Hale (1991), Kaufman (1979), and Sattler (1992).

In the population with normal vision, the relationship between the presence of refractive errors requiring corrective lenses and intelligence and academic achievement has been studied by a number of researchers. Williams, Sanderson, Share, and Silva (1988) found that eleven-year-old children in a New Zealand sample population ( $N = 537$ ) presenting with myopia (near vision better than distance vision) performed significantly better on Verbal and Performance Scales of a short version of the WISC-R and on a

measure of reading ability than children with no refractive errors. Children with hyperopia (better distance than near vision) had slightly lower Verbal and Performance IQ scores than the children with no refractive errors and significantly lower results than children with myopia.

Similarly, Stewart-Brown, Haslum, and Butler (1985) compared children who presented with mild visual anomalies to children with perfect vision and found that children with myopia obtained higher intelligence scores while children with amblyopia (reduced vision in one eye) scored lower on the British Ability Scales.

Higher test scores have also been found on tests of reading, arithmetic, and general ability in children ( $n = 403$ ) who had not presented with refractive errors at age seven but who had developed myopia by age 11 within a large British sample (Peckham, Gardiner, & Goldstein, 1977).

Consistent with the above results, a meta-analysis by Simons and Gassler (1988) revealed average or above average reading levels in children with myopia and with eye deviation when looking at a distance. Below average reading ability was found in children with hyperopia and with eye deviation when fixating at near.

#### Cognitive Functioning in the Population with Low Vision

Some research attention has been devoted to the group of children with more extensive eye disorders. Within this population, studies on cognitive functioning have in the

past focused on children with total blindness (Tillman, 1967; Tillman & Bashaw, 1968) or with visual acuities less than 20/200 (Ammerman et al., 1986; Beck & Lindsey, 1986).

Measuring the intellectual level of children who are totally blind can be a challenge. Warren (1984) discussed several of the major issues surrounding the construction of such a measure. He emphasized the need to recognize that the life experiences of children who are sighted and those who have no vision are very different and this fact would have to be reflected in different measures available for each. In addition, as with children who are sighted, relying extensively on verbal tasks may not adequately measure the full range of capabilities of the child who is blind. Warren also underscored that offering a tactile form of a visual item is not an acceptable solution unless research has determined that it offers a conceptually equivalent challenge compared to the visual item.

Bauman and Kropf (1979) reported that the Verbal Scales of the Wechsler Intelligence tests were the most often used measure with children and adults who had no remaining vision but norms are not available for this specific population (Van Hasselt & Sisson, 1987). In addition, a number of measures have been created or adapted to measure the verbal and non-verbal intelligence of children who are totally blind (Sattler, 1992). The Blind Learning Aptitude Test (1969) allowed the measurement of non-verbal abilities by

using an embossed form problem format. The Tactile Test of Basic Concepts (1970) was an adaptation of the Boehm Test of Basic Concepts. Adaptations of the Stanford-Binet have been made available through the Interim Hayes-Binet (1942; an adaptation of the 1937 Stanford-Binet) and the Perkins-Binet Tests of Intelligence for the Blind, Forms N and U (1980). Genshaft and Ward (1982) noted the strengths of the Perkins-Binet to be the following: the substantial number of children with low vision and blindness included in the standardization, and the inclusion of tasks that measure both verbal and performance abilities. They also outlined problems with the material and the instructions of the test and suggested a number of modifications to remedy the situation. While the test is still offered in some settings as part of a battery of tests, it can not be obtained from the Perkins School any longer, following widespread questioning of its overall validity (C. Underwood, Perkins School for the Blind, Watertown, Massachusetts, personal communication, April 11, 1994).

The population with some remaining vision presents different assessment challenges. It is questionable whether research information obtained from children who are blind and severely visually impaired can be indiscriminately applied to children who present with a moderate degree of visual impairment and who have had different life experiences. While Form N of the Perkins-Binet Tests of

Intelligence for the Blind was meant to be used with children with no vision, Form U was recommended for children with some usable vision. Information on reliability and validity was reported to be absent from the administration manual of the Perkins-Binet (Gutterman, Ward, & Genshaft, 1985).

However, Teare and Thompson (1982) administered both the Perkins-Binet Form U and the WISC-R or WAIS to 14 children/adolescents with usable vision (20/400 or better). The mean score on the Perkins-Binet was 96.14 (SD = 29.58) and the WISC-R/WAIS was 90.00 (SD = 19.80) and the correlation between the scores was .93, suggesting that the two tests were comparable. The authors noted that the standard deviation for the Perkins-Binet was much larger than for the Wechsler scales.

Gutterman, Ward, and Genshaft (1985) compared the performance of 52 children with low vision on the Perkins-Binet (Form U), the WISC-R (Verbal Scale), and the Wide Range Achievement Test. The children obtained a mean IQ score of 98.91 (SD = 25.41) on the Perkins-Binet and 83.79 (SD = 15.38) on the Verbal Scale of the WISC-R. Except for the youngest grade level, the correlations between the Perkins-Binet and the WRAT were lower than between the WISC-R and the WRAT. Citing test administration problems and limited concurrent validity data, Gutterman et al. (1985) concluded that the Perkins-Binet, Form U, was inappropriate

for this population. Like Form N of the test, the Perkins-Binet Form U is not available from the Perkins School for the Blind (C. Underwood, personal communication, April 11, 1994).

Sattler (1992) suggested that if a child's or adolescent's vision was not severely reduced, the Stanford-Binet or the age-appropriate Wechsler Scale could be administered. Many items of both tests require close attention to visual detail and could be seen as penalizing children with restricted vision. One study was found that attempted to address this possibility. Pintner (1942) compared the performance of 285 children with visual acuities in the range of 20/70 to 20/200 between the ages of approximately 10 to 12 years on the standard version of the Stanford-Binet and a revised version in which visual materials (pictures) had been enlarged about one and one-half times and large beads and strings were double the size of the standard material. Results were not found to be significantly different on the two versions of the tests. Pintner concluded that it was not necessary to change the visual material when assessing children who were partially sighted.

An overview of the literature revealed that the impact of limited vision on children who have visual acuity that is within the range of 20/70 to (but not including) 20/200 has only received scant attention. However, a number of early



studies (Bateman, 1963; Karnes & Wollersheim, 1963) examined various areas of psychological functioning in children who were partially sighted and were participating in resource room or special class programs in the state of Illinois. Of the 16 children studied by Karnes and Wollersheim (1963), only 25% had vision between 20/70 and 20/200 (50% had visual acuities better than 20/70). For the total group of children, a mean IQ of 104 (range of 86 to 147) was obtained on the Stanford-Binet Intelligence Scale, Form L-M (1960). At the time of the study, children who were mentally challenged were not deemed eligible for the program for the partially sighted. Bateman (1963) looked at 131 children and did offer specific information on degree of visual impairment. She reported that children with a moderate visual impairment (34% of the population studied) obtained a mean IQ score of 101.1 on the Revised Stanford-Binet Intelligence Scale, Form L, or on the verbal section of the Wechsler Intelligence Scale for Children.

Meighan (1971), in the context of a study focusing on self-concept, reported that the mean IQ for a group of adolescents with partial sight attending schools for the blind was 112.72. No information was offered on specific visual acuity or aetiology of visual impairment of the adolescents. In addition, the specific measures used to measure intelligence or how this information was obtained were not specified.

Jordan and Felty (1968) analyzed the institutional records of 253 students (ages 6 to 18 years) at the Michigan School for the Blind. The Interim Hayes-Binet, the Wechsler-Bellevue I (Verbal Scale), and the Wechsler Intelligence Scale for Adults (Verbal Scale) were reported to be the measures used to determine intelligence. Children with MVI were included in a group identified as having "borderline" vision (20/200 or better). The overall group with borderline vision obtained IQ scores in the average range ( $\bar{M} = 97$ ) when results on the various measures used were compared and averaged. The authors found no link between intellectual ability and degree of vision but did find that the presence of central nervous system involvement was correlated with lower intellectual functioning.

The Illinois Test of Psycholinguistic Abilities (ITPA) is reported to assess verbal and non-verbal aspects of psycholinguistic skills (Sattler, 1992). Sattler (1992) summarized a number of studies that have revealed the ITPA to be significantly correlated with other measures of cognitive ability. In a number of early studies with children with reduced vision, the ITPA was administered to children in resource room and special class programs for the partially sighted (Bateman, 1963; Karnes & Wollersheim, 1963). Karnes and Wollersheim (1963) administered a number of different measures to 16 children in such classes. The ITPA was given to seven of the 16 children, ones within the

age range corresponding to the standardization sample of the test. They reported that "the psycholinguistic processes involving visual and motor abilities of partially seeing children are significantly inferior to their auditory and vocal abilities" (p. 26). Only 25% of their overall sample ( $N = 16$ ) had vision in the 20/70 to 20/200 range and Karnes and Wollersheim did not specify what proportion of individuals given the ITPA had vision in the moderate range of visual impairment. In her study, Bateman (1963) did differentiate between various levels of visual impairment (mild, moderate, and severe) and reported that the 31 children with vision between 20/70 and 20/200 obtained results that were below the norms for the ITPA but did not show a specific visual channel deficit.

Gibbs and Rice (1974) administered the Revised Edition of the Illinois Test of Psycholinguistic Abilities (ITPA) to 24 children with visual impairments (20/40 or worse) under the age of 10 years 3 months. Children with reduced visual acuities were found to do significantly less well than a control group (with no visual impairment) on the visual subtests. Children with visual impairments had lower results on Visual Closure (identifying common pictures with missing parts) and higher results on Auditory Memory (repeating digits; Sattler, 1992) relative to their performance on the other subtests of the ITPA.

Daugherty and Moran (1982) assessed the

neuropsychological functioning of 51 children with limited vision between the ages of 7 to 18. Using the Wechsler Intelligence Scale for Children - Revised and the Wechsler Adult Intelligence Scale, no significant difference was found between the overall group ( $\bar{M} = 89.2$ ,  $SD = 16.9$ ) and the normative sample for the tests. Thirty seven percent of the children had vision better than 20/70 (mild impairment), 22% had vision between 20/70 and 20/200 (moderate impairment), and 41% were considered legally blind (vision 20/200 or poorer). Data for the mildly and moderately impaired were combined and the group was identified as "partially sighted". A greater range of scores than expected on the intellectual measure was noted within the population with visual impairment: a range of 69 to 122 ( $\bar{M} = 91.3$ ,  $SD = 14.5$ ) on the Verbal Scale for the group that was partially sighted and 62 to 136 ( $\bar{M} = 97.3$ ,  $SD = 21.2$ ) for the group that was legally blind. The range was similar for both groups (48 to 115) on the Performance Scale. A mean Scale Score of 89.2 ( $SD = 17.9$ ) was obtained by the group with vision better than 20/200 and a mean scale score of 80.2 ( $SD = 17.9$ ) was obtained by the group with vision worse than 20/200. Such variability in scores occurred despite the fact that children who presented with additional handicaps (who were mentally challenged, physically or hearing impaired, emotionally disturbed) were excluded from the study. The group identified as legally blind showed

significantly greater discrepancy between verbal and performance IQ (mean difference of 17) than the group that was partially sighted (mean difference of 2).

Groenveld and Jan (1992) completed an archival study on the intellectual functioning of 118 children between the ages of 3 years 10 months and 16 years 11 months, seen at the Visually Impaired Program at the British Columbia's Children's Hospital. Children with additional neurological handicaps were excluded. Comparisons were made on the results obtained by children divided into three groups in terms of degree of visual impairment: (a) moderately impaired, 20/60 up to (but not including) 20/200; (b) severe to profound impairment, 20/200 up to (but not including) finger counting at one meter; and (c) near-total and total blindness, finger counting at one meter to no sight. Results suggested that the intellectual functioning of children with moderate visual impairment was not significantly different from the results obtained with the normative sample ( $M = 10$ ,  $SD = 3$ ) of the Wechsler scales, with a range of scale scores from 9.0 to 11.1 on the WISC-R. Specifically, the MVI group obtained an average scale score of 9.5 on Information (standard deviations not reported), 11.1 on Vocabulary, 9.1 on Picture Completion, and 10.7 on Block Design. Results on the subtest Digit Span were not reported. Information on what each relevant subtest of the WISC-R measures is offered in Appendix A. On the other

hand, children with severe to profound visual impairment were reported to present with lowered results on the Picture Arrangement (mean scale score = 6.9) and Coding (SS = 6.0) subtests of the WISC-R, while they did better on Block Design (SS = 10.9). Children with near-total and total blindness were unable to complete any of the Performance Scales.

Talbot (1992) divided the 29 children with visual impairment (6 to 8 years of age) she studied using guidelines that were slightly different from previous studies. She defined mild visual impairment as distance vision of 20/40 to 20/70 (n = 7), moderate as less than 20/70 but better than 20/160 (n = 10), and severe as 20/160 or worse (n = 12). The basis for dividing the groups along these guidelines was not discussed. For most measures, Talbot (1992) combined the data for the Mild and the Moderate group. The control group was composed of 12 children with normal vision. She found no significant differences between groups on an overall measure of verbal intelligence (WISC-R) and on individual subtests of the verbal section of the WISC-R. To assess the groups' visual perceptual, visual-motor, and visual-spatial abilities, Talbot (1992) administered two subtests from the Performance Scale of the WISC-R (Block Design and Object Assembly), two subtests of the Kaufman Assessment Battery for Children (K-ABC; Gestalt Closure and Spatial Memory), the Raven's

Coloured Progressive Matrices and the Beery Test of Visual Motor Integration. Gestalt closure relies on attention to detail and visual organization while Spatial Memory focuses on the immediate recall of spatial information. The Raven is a measure of non-verbal reasoning ability applied to visual designs (Sattler, 1992). The groups (Mild/Moderate, Severe, and control) performed similarly on Object Assembly, on Spatial Memory and on the Raven. On the Gestalt Closure subtest, the Mild/Moderate group's results were in between the results of the Severe visual impairment and the control group but were not significantly different from either. When levels of Verbal IQ and age at testing were taken into consideration, Talbot (1992) found that visual impairment did not have an effect on the ability to copy visual designs as measured by the Beery.

A limited number of studies have looked at the functioning of children presenting with specific eye conditions. Rogers, Tishler, Tsou, Hertle, and Fellows (1981) found that infants with complete bilateral cataracts (clouding of the lens of the eye) who had their cataracts removed by 8 weeks of age and who were fitted with appropriate lens correction, had acuities similar to normal control infants, while infants who had operations to remove cataracts after 8 weeks of life showed reduced visual acuities for their chronological age. The three groups were compared on results obtained with the Bayley Scales of

Infant Development. The functioning of infants operated upon early (before 8 weeks) was found to be similar to the range of functioning observed within the control group, but the infants operated upon later (after 8 weeks) presented with delays in general development.

Cole, Conn, Jones, Wallace, and Moore (1987) compared the performance on cognitive measures of 12 children with albinism (hypomelanoses of the eye) with distance vision 20/60 to 20/200, to a matched sample of children with other visual diagnoses (distance vision: 20/60 to 20/300). Results revealed no difference between the two groups on the overall Performance IQs of the Wechsler Scales (Wechsler Intelligence Scale for Children - Revised, Wechsler Preschool and Primary Scale of Intelligence). In both groups, children did better on the Block Design subtest and worse on the Picture Arrangement and Coding subtests than the normative sample. On the other hand, the children with albinism performed significantly better on most verbal subtests (except Similarities) than the children with other visual diagnoses. In addition, the children with albinism showed a marked discrepancy between the Verbal and Performance Scales (average difference of 19.91 compared to 11.66 for the control group) with Verbal results consistently higher than the Performance results (Cole et al., 1987).

Talbot (1992) compared the performance of 6 to 8 year



old children divided into groups by aetiology of visual impairment (albinism, bilateral congenital cataracts or retinopathy of prematurity) to each other and to a control group on a variety of measures (verbal, visual perceptual, visual spatial, tactile, and orientation in space). When the groups were compared on the basis of aetiology of visual impairment, there were no significant differences on the overall verbal scores. Looking at individual subtests, the group with retinopathy of prematurity (ROP) did significantly less well than the control group on the subtest Arithmetic: the group with ROP obtained a mean scale score of 8.50 ( $SD = 2.43$ ) and the control group obtained a mean scale score of 12.00 ( $SD = 2.17$ ). On this same subtest, differences were also found between the performance of children presenting with cataracts ( $M = 10.64$ ,  $SD = 3.07$ ) and children presenting with albinism ( $M = 12.92$ ,  $SD = 2.50$ ). These differences can be seen as particularly significant in view of the small sizes of the groups: six children with ROP, 12 with albinism and 11 with congenital cataracts. In the same study, the degree of visual loss rather than eye condition was found to be related to performance on tactile tasks (Talbot, 1992). In addition, children diagnosed with retinopathy of prematurity showed greater deficits in visual perceptual and visual spatial skills than the children with other visual diagnoses (congenital cataracts and albinism) and the children with

normal vision.

Looking at specific eye conditions, Cole et al. (1987) found that children with albinism obtained higher Verbal IQ's than children with other ocular disorders, but in another study, Talbot (1992) did not replicate these findings, possibly because of the small size of the contrasting group comprised of children with ROP.

The above review of available research does suggest that generally children with MVI function in the average range on tasks that measure verbal intelligence. In the area of visual-perceptual and visual-motor abilities, variability in performance from average to below average has been noted between tasks and between groups of children with specific eye conditions. Studies have also suggested a possible relationship between refractive errors and intellectual functioning within a population that is considered essentially normally sighted.

Even though the construct of intelligence has been operationalized in many ways and efforts are continuing to refine its measurement, one fact has received general support. That is, performance on intelligence tests predicts academic achievement, with correlations generally in the range of .50 to .60 (Kaufman, 1979). The next issue to be addressed is whether the presence of a moderate degree of visual impairment has an impact on the academic achievement of children and adolescents.

### Academic Functioning of Children with Moderate Visual Impairment

A number of early studies have reported significant educational delays in children with both moderate and severe low vision (Birch, Tisdall, Peabody, & Sterrett, 1966; Karnes & Wollersheim, 1963). In a study of self-concept in adolescents attending schools for the blind, Meighan (1971) reported a mean score of 89.87 in the language area (no standard deviations reported) and 87.45 in paragraph reading on the Stanford Achievement Test. As reported earlier, the mean IQ for this group was 112.72. On the other hand, Bateman (1963) found no reading delays in a group of children with MVI when performance was considered in terms of present grade placement.

While many parents of children with visual impairment have reported educational difficulties in their children (Loeb & Sarigiani, 1986), only one recent study was found for this literature review that specifically addressed the issue of academic functioning. Daugherty and Moran (1982) found that children who were partially sighted (visual acuity better than 20/200) generally functioned academically below their cognitive levels in the areas of reading comprehension and mathematics; reading decoding skills were found to be average. Measures used were the Wide Range Achievement Test and the Monroe-Sherman Test (reported to be from the Halstead-Reitan Neuropsychological Battery). They

indicated that the children demonstrated signs of neurological involvement and academic delays, similar to the functioning of children with "learning disabilities", despite the fact that children who had been identified as mentally challenged, physically or hearing impaired, or presenting with emotional difficulties in addition to the visual impairment had been excluded from the study.

Daugherty and Moran (1982) speculated that average reading decoding skills in the population studied may have been the result of a special phonics program introduced into the curriculum for children with visual impairment. They noted that the children's academic performance was not related to measures of distance vision.

Results of the few studies available have suggested that children with MVI perform generally below age-expectations in school subjects. The following section will address the well known link between academic achievement and self-esteem in the population with normal vision and the similar relationship expected in the population with moderate visual impairment.

#### Self-Esteem and Children with Low Vision

There are a number of theories concerning the nature of self-esteem in children with no impairments. Harter (1987) has proposed that self-esteem is the result of a child's judgment of his/her competence in personally significant areas, and of the degree of social support (parents and

peers) the child experiences. Academic achievement (Battle, 1993) and cognitive ability (Backman & O'Malley, 1977) have been linked to a child's self-esteem and, in turn, self-esteem has been found to significantly affect academic performance (Battle, 1993; Chapman, 1988; Kershner, 1990). In the reciprocal relationship between academic achievement and self-esteem, the direction of influence would appear to be stronger from achievement to self-esteem than from self-esteem to academic achievement (Liu, Kaplan, & Risser, 1992). While self-esteem has been reported to be influenced by academic achievement in pre-adolescent children, global self-esteem has been found to be dependent on body image in adolescents (Hagborg, 1993). In addition, the actual level of self-esteem has been found to vary as a function of age. Simmons and Blyth (1987) recorded a sharp decrease in self-esteem between the ages of 11 and 13, possibly as a result of changes in personal and societal expectations. After the age of 13 or 14 and through the remainder of the adolescent period, self-esteem has been found to increase steadily (McCarthy & Hoge, 1982; O'Malley & Bachman, 1983; Simmons & Blyth, 1987). Through both early and late adolescence, the self-esteem in girls has been found to be lower than in boys (Simmons & Blyth, 1987).

The impact of low vision or blindness on the psychosocial experience of an individual and the resulting self-concept has been the source of conjecture and study for

many years (Tuttle, 1984). Tuttle stated that "self-esteem is the affective component of a person's self-concept, the way he feels about himself. High self-esteem is reflected in a person's judgment of his own value and worth" (p.228). Tuttle (1984) suggested that individuals with low vision experienced more difficulty in achieving self-acceptance and self-esteem than individuals who were totally blind because behaviours resulting from reduced vision were often misunderstood producing "ambiguities, embarrassments, and conflicts" (p. 20). In addition, the need to use specialized equipment (eg., to enlarge print) often singled individuals out, creating a distance with others (Tuttle, 1984). Similarly, Lowenfeld (1971) summarized the findings of a small number of studies by stating "the partially seeing tend to be less well adjusted than either the blind or the seeing ... Apparently the marginal ... position ... of the partially seeing child often intensifies his personality and adjustment problems" (p. 296).

Both an early and a more recent study included the administration of the Tennessee Self Concept Scale to adolescents who were visually impaired. In the early study, Meighan (1971) gave the measure to 83 individuals who were partially sighted and 120 individuals who were totally blind between the ages of 14 and 20 attending schools for the blind in Baltimore, Philadelphia, and New York City. The adolescents and young adults described themselves in more

negative terms than the normative sample for the test in all areas measured (Identity, Self-satisfaction, Behavior, Family Self, and Social Self). Meighan reported a similar pattern for both the partially sighted and the totally blind, for males and females, as well as for African-Americans and Caucasian-Americans.

More recently, Beaty (1991) found that the total score on the Tennessee Self Concept Scale was lower for a group of adolescents with a visual impairment than for a control group (ages 12 to 19). Differences were not found on three of the five subscales: Physical Self, Personal Self, and Social Self. The adolescents who were visually impaired scored lower on the Moral/Ethical Self subscale and on the Family Self subscale. Levy-Shiff et al. (1994) described these two subscales as measuring a person's perception of "moral worth", whether one is a good or bad person, and the person's "feelings of need, adequacy, and value as a family member" (p. 326). Like Meighan, Beaty offered no information on the degree or aetiology of the visual impairments. Warren (1994) questioned the validity of the Tennessee Self Concept Scale for the population with a visual impairment because other studies have found differences in self-esteem related to age (McCarthy & Hoge, 1982; O'Malley & Bachman, 1983; Simmons & Blyth, 1987), sex (Simmons & Blyth, 1987), and race (Porter & Washington, 1979) while Meighan (1971) did not.

Using the Self-Concept Adjustment Score, a measure developed for the visually impaired, Schindele (1974) compared three groups of children born in 1961 and 1962: the partially sighted (20/60 to 20/400), the severely visually impaired (20/400 to 20/1000), and the totally blind (less than 20/1000). Schindele did not find any difference in self-concept between children who were visually impaired or sighted, nor between the children at different levels of visual impairment. He did find that the self-concept of children in regular schools did improve with increasing age while the self-concept of children in residential schools decreased as they became older. A positive correlation was found between intelligence and self-concept in children who were visually impaired in regular school. It is important to note that the group with partial vision included a number of children who would be considered severely visually impaired or legally blind (vision at or worse than 20/200).

In a study focusing on the impact of a hearing loss, Loeb and Sarigiani (1986) compared children with a hearing impairment ( $n = 64$ ) to those with a visual impairment ( $n = 74$ ), and a control group ( $n = 112$ ) between the ages of 8 and 15 years of age. A number of measures that focus on various aspects of self-esteem were administered: Nowicki-Strickland Children's Locus of Control Scale (1973), Q-sort task (satisfaction and dissatisfaction with self), Piers-Harris Children's Self-Concept Scale (1964), expectation towards a



tower-building task, and completion of sentence stems. The groups of visually and hearing impaired individuals were comprised of children who presented with mild to profound/total impairment in sensory functioning. Children who demonstrated additional impairments in other areas (physical, mental, or emotional) were excluded. Results on the overall score and on subscales of the Piers-Harris as well as on the other measures administered suggested that the self-esteem of children who were visually impaired was not significantly different from the self-esteem of children without a sensory impairment and was significantly better than the self-esteem of children with a hearing loss. Self-esteem was not found to correlate significantly with severity of impairment for either the children with a visual loss or a hearing loss.

In summary, research in the area of self-esteem in the population with moderate visual impairment is very limited, with only one study (Loeb & Sarigiani, 1986) looking at both individuals in the pre-adolescent and adolescent stages of development. Available studies do suggest that levels of self-esteem generally tend to be consistent with levels observed in the population with normal vision.

#### Critique of Empirical Research Reviewed

As the above review has shown, there is a limited body of research on the psychological functioning (intellectual, academic, and self-esteem) of children and adolescents who

present with a moderate degree of visual impairment. A number of factors have been identified as contributing to a similar paucity within the population with severe visual impairment (Ammerman et al., 1986). First, locating sufficient numbers of children who are similar on key variables (e.g., age, visual acuity, eye condition, functioning level) to make comparisons possible has proven to be a real difficulty for researchers. In addition, while the need to include a control group has not been questioned, it has been less clear who should comprise such a group (Warren, 1994). In the past, a control group was always made up of individuals with normal vision but the comparisons afforded may not have been meaningful since the focus was on the implications of having any impairment and not necessarily on the impact of a specific impairment. The issue of which group (e.g., individuals with motor impairments, with different sensory limitations) should be chosen as an appropriate control group has not been fully resolved. These issues are also considered relevant in terms of studies with individuals with MVI. Since the studies reviewed above have generally reported low average to average performance (particularly on measures of intelligence and self-esteem) within the population with MVI, the population with normal vision would appear to be a satisfactory group for comparison purposes.

Perceptions from the general population and from the

many professionals who work with individuals with moderate visual impairment may have played a role in the limited number of studies in this area. Often individuals with MVI are assumed to be either similar to the population with normal vision or to the population with severe visual impairment. At different times, the results of the studies that apply to either of these groups have been perceived as being relevant to the population with moderate visual impairment. There has therefore not been a perceived need to study the group with MVI independently and the characteristics of this population have not been clarified. Yet there were enough indications of differences suggested by the studies outlined to warrant the considerations of the group with MVI as separate from children with normal vision and from the group with more limited vision.

It remains that the results of the limited number of studies that have been completed need to be confirmed and expanded through further research. Furthermore, Warren (1994) emphasized the need to move from a study of variables in isolation (particularly self-perception) to a study of the relationship between related constructs. While the relationship between specific cognitive tasks and academic performance needs to be further elucidated, the links between self-esteem and other areas of functioning, particularly in the academic area, need to be clarified within the population with impaired vision.

The studies reviewed have utilized self-report measures exclusively to obtain information about how the children feel about themselves. Additional information may be gained by using other methods, such as open ended questions, to gain a greater understanding of the children's experience of having a moderate degree of visual impairment. Open ended questions may encourage a focus on different but similarly significant perceptions and allow access to different memories (Krahn, Hohn, & Kime, 1995). Krahn, Hohn, and Kime, reporting on a study of families' adjustment to a child's handicap, proposed that the process of asking about likes and dislikes related to an experience might encourage a more in-depth scrutiny of remembered experiences than ratings of such experiences.

A number of the studies reviewed for the purpose of the present literature review did present some statistical limitations. A number of them failed to report important statistical information (e.g., means, standard deviations) that would be helpful in interpreting the information gathered and in applying that information in clinical and school settings where children with a visual impairment would be referred for a psychological assessment. In addition, some of the differences obtained in existing studies may have been found to be nonsignificant due to low power related to small sample size. As well, the use of particular statistical tests (i.e., correlations) have been

used in some studies and may have obscured interactions that would have required a different statistical approach (i.e., analyses of variance, regression analysis, non-linear analysis).

In attempting to isolate the effect of visual impairment on areas of functioning, some of the studies outlined specifically stated that only children who did not present with other handicaps were included (Daugherty & Moran, 1982; Groenveld & Jan, 1992). In other cases, there was no indication that exclusion or inclusion rules were used. But surveys have revealed a high rate of multiple handicaps in the population with visual impairment. Williamson, Desmond, Andrew, and Hicks (1987) found that out of 102 young children identified as legally blind from Houston (Texas) and surrounding areas, 17% presented with a hearing loss, 48% with cerebral palsy, 46% with seizures, and 78% with severe developmental delays. Only nine infants (8.8%) presented with a single diagnosis of visual impairment. Similarly, a more extensive demographic study of preschool visually impaired children (Bishop, 1991) suggested that between 40 to 60% of the children were considered multiply handicapped (were also mentally challenged, had speech/language difficulties, and/or presented with neurological symptoms). The paucity of prevalence data on children and adolescents who are moderately visually impaired also means that there is little

data on the rate of occurrence of other handicaps in this population. Thus, future research studies will be most informative if they are inclusive and accumulate data on children with a visual impairment both with and without other handicaps.

### Rationale for the Study

As reviewed earlier, the available literature suggests that children with MVI and no other handicaps function generally within the normal range in terms of intellectual ability. There are, however, suggestions that they experience academic difficulties, particularly in reading comprehension and mathematics. Research in the area of self-esteem is limited but does suggest that the children and adolescents with moderate low vision are similar to fully sighted children in how they feel about themselves.

The purpose of the present study was to gather further information on the population of interest in the areas of intelligence, academic achievement, and self-esteem. The performance of children and adolescents with MVI and other handicaps was compared to the performance of a group with moderate visual impairment and no other handicap. Both groups in turn were compared to the normative data available for the measures used.

### Hypotheses

Hypothesis I. The intellectual functioning of the group of children with moderate visual impairment with other

handicaps was expected to be significantly lower than the intellectual functioning of the group of children with moderate visual impairment **without** other handicaps. This latter group would be expected to demonstrate ability levels consistent with the normative sample.

Hypothesis II. Academic functioning in the areas of reading (real and nonsense words), spelling, arithmetic, and reading comprehension would be significantly lower for the group of children with MVI (without and with other handicaps), compared to the normative sample.

Hypothesis III. As with children with normal vision, the level of self-esteem of the population with MVI was expected to be influenced by the following variables: age, sex, level of intellectual functioning, and academic achievement. Self-esteem in the population of interest was expected to show age-related variations: a level within the average range would be found in elementary school children with moderate visual impairment, while individuals in early adolescence would present with a lower level of self-esteem (Simmons & Blyth, 1987) which would progressively increase in later adolescence (McCarthy & Hoge, 1982; O'Malley & Bachman, 1983). In addition to the above factors, it was hypothesized that visual acuity and the presence of other handicaps might also have an impact on the self-esteem of the children.

Hypothesis IV. Self-esteem measures standardized on

the general population focus on general concerns and do not address specific issues related to the experience of having a visual impairment. If these issues are central to the self-concept and self-esteem of the individual, their significance may be expressed more readily as a response to open-ended questions. It was predicted that there would be a significant number of children/adolescents who would mention some aspect of having a visual impairment in the context of an interview focusing on their interests and concerns. Such information would complement quantitative data obtained on the psychological functioning of children and adolescents who present with moderate visual impairment.



## CHAPTER II

### METHOD

#### Participants

A total of 57 children (21 females, 36 males) between the ages of 9 and 17 years participated in the study: 19 from Nova Scotia, 16 from New Brunswick, 5 from Prince Edward Island, and 17 from Ontario. They were children and adolescents who had been identified as moderately visually impaired with visual acuity in the range between 20/70 up to (but not including) 20/200 by an eye specialist (ophthalmologist, optometrist) or a consultant/resource teacher for the visually impaired.

The children who were able to complete the measures formed two groups: children/adolescents with a moderate visual impairment **without** other handicaps (MVI; 11 females, 21 males) and children/adolescents with MVI **with** other handicaps (e.g., chromosome abnormalities, language deficits, neurological involvement) (MVI+; 6 females, 10 males). The presence of other handicaps was established through the parents' response to question #20 on the questionnaire completed by them (Appendix B): "Has the identified child/adolescent been diagnosed as having other problems besides the visual impairment? (If yes, please specify)."

Because MVI was found to have a very low incidence and services were organized differently in various Canadian provinces, locating potential participants was undertaken in two regions (Maritime Provinces and Ontario) and required a different approach in each. In the Maritime Provinces (New Brunswick, Nova Scotia, and Prince Edward Island), services are centralized through the Atlantic Provinces Special Education Authority - Resource Centre for the Visually Impaired (APSEA - RCVI) in Halifax, Nova Scotia. The Superintendent and the Board of Directors of APSEA gave their approval to the project. Permission was given to the experimenter to forward invitations to all families of children who met the criteria. During the period from October, 1994 to June, 1995, 81 invitations were sent out to the parents of children and adolescents who were between the ages of 9 and 16 years 11 months or who turned 9 during that period. At the end of May 1995, the 40 families who had not responded were re-invited.

Table 2 presents the number of children who were registered with APSEA-RCVI as visually impaired/blind in each Maritime Province; the number of children who have a moderate visual impairment (percentages in terms of provincial and total population); the number of families who were forwarded an invitation package; the number of families who agreed to participate (percentages); the number of participants who were able to complete the measures; and the

Table 2

Population with a Visual Impairment in Three Maritime  
Provinces and Participants with a Moderate Visual Impairment

Population	Provinces			Total
	N.S.	N.B.	P.E.I.	
	<u>n</u>	<u>n</u>	<u>n</u>	<u>N</u>
<hr/>				
Registered				
with APSEA -				
RCVI	114	79	18	211
MVI	46	32	7	85
(% of pop.)	(40%)	(41%)	(39%)	(40%)
Met criteria				
for study	42	32	7	81
Sex				
Female	15	16	3	34
(%)				(42%)
Male	27	16	4	47
(%)				(58%)

(table continues)

Table 2 (continued)

Provinces				
Population	N.S.	N.B.	P.E.I.	Total
	<u>n</u>	<u>n</u>	<u>n</u>	<u>N</u>
Families who participated	19	16	5	40
(% of MVI)	(48%)	(52%)	(83%)	(49%)
Participants with complete data	13	14	4	31
Sex				
Female	3	9	1	13
Male	10	5	3	18
Demographic information only	6	2	1	9
Sex				
Female	3	1	0	4
Male	3	1	1	5

number of participants who were unable to complete the measures because of extensive additional disabilities (e.g., hearing impairment, cerebral palsy, lack of communication skills). In total, 40 children in the Maritime Provinces participated: 17 girls (42.5%) and 23 boys (57.5%). In New Brunswick, only children/adolescents registered through the English-speaking school boards were considered eligible. Four eligible children in Nova Scotia were excluded: two were receiving their education totally in French, one had recently immigrated from a non-English speaking country, and one child's visual impairment was the result of an accident. Four invitation packages were returned (families had moved and there were no forwarding addresses).

In Ontario, the Canadian National Institute for the Blind (CNIB) in Windsor, serving the Essex, Kent, and Lambton counties was contacted. The administrator gave approval and indicated that 19 invitation packages were needed to forward to families who met the criteria. The superintendent of local school boards were sent information about the research project and were asked to support the study. Three school boards (The Board of Education for the City of Windsor, The Windsor Separate School Board, and The Essex County Board of Education) approved the project. They requested 29 invitation packages, both for identified children and for children who were expected to be identified in the near future.

When an insufficient number of participants were located, other sources were contacted: CNIB's VIEWS (the provincial association of parents of children with visual impairment) agreed to publish information about the study in their newsletter and the Resource Consultant, Brantford School for the Blind, forwarded information about the study to resource teachers for the visually impaired across the province. Three additional School Boards requested further information and two agreed to participate (Durham Board of Education in Whitby, and Orangeville School Board).

A list of eye specialists and low vision centres who were offered information about the study is presented in Table 3. A copy of the invitation letter forwarded to ophthalmologists and optometrists is included in Appendix C. Six ophthalmologists and four optometrists, the chief ophthalmologist of the Hospital for Sick Children and of the Children's Hospital of Eastern Ontario, and the director of the Scarborough Low Vision Clinic responded positively to the invitation. They were given the number of invitation packages that they requested to distribute to parents. In total, 203 parent invitation packages were made available. Each package contained a self-addressed envelope that directed the response card to the researcher at the University of Windsor. Parents who indicated an interest in the study were contacted by telephone and a mutually agreeable time and place was set to collect data.

Table 3

Eye Specialists and Low Vision Centres who were offered  
Information on the Study concerning Moderate Visual  
Impairment

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Ophthalmologists listed in the Yellow Pages of the Windsor  
telephone book (12 individuals)

Optometrists listed in the Yellow Pages of the Windsor  
telephone book (22)

Ophthalmologists listed in the Yellow Pages of the London  
telephone book (16)

Chief of Ophthalmology, Hospital for Sick Children, Toronto  
Chief of Ophthalmology, Children's Hospital of Eastern  
Ontario, Ottawa

Paediatric Ophthalmologist, Kingston (listed in Yellow Pages  
of Kingston telephone book)

Director, Paediatric Clinic, Centre of Sight Enhancement,  
University of Waterloo

Director, Low Vision Clinic, University of Waterloo

Director, Scarborough Low Vision Clinic, Scarborough

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Seventeen children/adolescents (4 females, 13 males) in Ontario were seen in their local area to collect the necessary data. Their parents had received information about the study from the following sources: CNIB (one participant), VIEWS (one participant), Eye Clinic of the Hospital for Sick Children (one participant), Brantford School for the Blind (two participants), and School Boards (12 participants). Two male participants were from the same family and data from only one (based on child's age) were included in all analyses.

Demographic information about the children/adolescents who completed the various measures (MVI and MVI+) and the individuals who were unable to do so independently because of lack of expressive speech or the need to work through an interpreter (Other Group) are presented in Table 4. Additional information about the participants who were unable to complete the measures can be found in Appendix D.

The visual diagnosis of the participants and their frequencies are listed in Table 5. The co-morbid diagnoses and their frequencies for the MVI+ and the Other Group are presented in Table 6.

#### Materials and Measures

For the purposes of the present project, a low vision screening measure (Paediatric Low Vision Test Chart) was first administered. Although all children in the study had been designated as MVI by another health or educational



Table 4

Sociodemographic Information on Participants by Groups

Variables	Groups		
	MVI	MVI+	Other
	<u>n</u>	<u>n</u>	<u>n</u>
<hr/>			
Age (years)			
9	7	2	2
10	4	1	2
11	3	4	0
12	4	2	2
13	5	1	2
14	2	1	0
15	5	3	0
16	2	2	0
17	0	0	1
Sex			
Female	11	6	4
Male	21	10	5
Parent Education			
university degree	9	6	2
some university			
education	5	1	
community college	11	2	3

(table continues)

Table 4 (continued)

Variables	Groups		
	MVI	MVI+	Other
	<u>n</u>	<u>n</u>	<u>n</u>
Parent Education (continued)			
post high school			
training	2	0	3
high school diploma	22	5	8
no high school			
diploma	13	12	1
Attended a residential			
school			
never	24	10	7
1-2 weeks	2	2	1
6 months	2	0	0
1 year	0	1	0
more than 1 year	3	3	1

Note. MVI = visual impairment without other handicaps; MVI+ = visual impairment with other handicaps; Other = visual impairment with other handicaps but unable to complete measures.

Table 5

Eye Conditions of Participants by Groups

Variables	Groups		
	MVI	MVI+	Other
	<u>n</u>	<u>n</u>	<u>n</u>
<hr/> Visual Diagnosis			
albinism	9	0	0
aniridia	1	1	0
achromatropsia	2	0	0
cone-rod dystrophy	2	0	0
congenital cataracts	5	1	1
congenital nystagmus	4	2	1
cortical visual imp.	0	0	2
hyperplastic vitreous	1	0	0
Lebers	1	0	0
myopia	1	4	1
optic nerve atrophy	2	6	3
optic nerve hypoplasia	1	2	1
retinitis pigmentosa	1	0	0
retinal dystrophy	2	0	0

Note. MVI = without other handicaps; MVI+ = with other handicaps; Other = with other handicaps but unable to complete measures.

Table 6

Co-Morbidity in Participants by Groups

Variables	Groups	
	MVI+	Other
	<u>n</u>	<u>n</u>
<hr/>		
Co-morbidity		
cerebral palsy	2	7
chromosome abnormality	3	1
cleft lip & palate	0	1
hearing impairment	0	1
heart condition	0	1
hydrocephalus	1	0
leukodystrophy	1	0
motor impairment	2	1
pituitary dysfunction	1	0
seizures	1	3
sensory neuropathy	1	0
tumours	4	0

Note. MVI+ = visual impairment with other handicaps; Other = visual impairment with other handicaps but unable to complete measures.

professional using a variety of measures, the screening check allowed for consistent data collection on acuity. Since eligibility for services is usually determined by performance on distance visual measures, and since there is generally a high correlation between near and far visual acuity ( $r = .74$ ; Coren, 1987), only distance acuity was measured. The intellectual functioning of the children and adolescents was measured using the Wechsler Intelligence Scale for Children-III (1991). Academic levels were assessed through the Wechsler Individual Achievement Test (1992), as well as the Word Attack subtest of the Woodcock Reading Mastery Tests - Revised (1987). Self-esteem was measured using the Piers-Harris Self-Concept for Children (1969). The children/adolescents were also asked to respond to questions from a structured questionnaire created by the author, the Personal Interests and Concerns Interview (Appendix E).

There are a number of measures that have the purpose of measuring self-esteem (see Chiu, 1988, and Harter, 1990, for reviews), such as the Piers-Harris Self-Concept for Children and Harter's Self-Perception Profile for Children. Both measures are used in various clinical settings and for research purposes. Research has revealed that when presented with forced-choice format questions (composed of a stem describing an event or a trait and two alternative answers expressed in phrases of various lengths), preschool

children (Mischel, Zeiss, & Zeiss, 1974) and even children in grades one and two (Crandall, Katkovsky, & Crandall, 1965) tended to choose the last alternative. There is a possibility that children with developmental levels below their chronological ages might respond in a similar fashion. Additionally, Silon and Harter (1985) found the Self-Perception Profile for Children inappropriate for children who were moderately intellectually challenged. The Piers-Harris was chosen as a measure of self-esteem because of its short statement stem and simple yes/no response format. In addition, the Piers-Harris may be used with children in both middle childhood and adolescence, allowing results to be interpreted without the confounding effect of different instruments (Harter, 1990).

The Paediatric Low Vision Test Chart (PLVT; E. L. Novak, Designs for Vision, Inc.). This low vision screening measure allows the calculation of distance acuity. It is composed of black outline drawings of a number of objects (e.g., ice-cream cone, tree, person) presented on white cardboard, 25 X 32 cm in size. The initial drawings for 20/700, 20/550, and 20/400 acuity levels are presented individually. At each of the subsequent acuity levels, the pictures are progressively smaller and there are increasingly more pictures offered on each card. For example, one card contains both the 20/200 and 20/180 measurement. For 20/200, the picture of the clock is

approximately 9 cm in width, while the picture of the apple and airplane (for 20/180) is approximately 7.5 cm in width. The pictures are presented with the participants wearing corrective lenses if these have been prescribed.

The measure does not offer norms or reliability data. Such information is absent from most of the other available low vision screening measures as well (Fern & Manny, 1986). Studies with normally sighted children have revealed that visual acuity is reduced at birth and improves over the first few years to reach normal levels (20/20) by 18 months of age at the latest (Hoyt, Nickel, & Billson, 1982). It is therefore assumed that all children and adolescents from 9 to 16 years of age would be able to recognize the drawings of size 20 at 20 feet (6 m) wearing corrective lenses if prescribed if a visual impairment did not exist.

As recommended by Faye (1984), testing during the present study was generally completed from a distance of 10 feet (3 meters). On three occasions, testing had to be completed at 5 feet because of limited space (one child in Nova Scotia and one child in Ontario) or because it was the child's preferred viewing distance (one child in Nova Scotia). The smallest size the child/adolescent was able to correctly identify (50% correct if more than one picture of the same size was presented) determined his/her distance visual acuity: recognition of pictures on the line labelled 40 from 10 feet (10/40) was equivalent to 20/80. Similarly,

recognition of pictures on the line labelled 30 from 5 feet (5/30) was equivalent to 20/120.

The Wechsler Intelligence Scale for Children - III (WISC - III; Wechsler, 1991). The WISC-III is the latest revision of the Wechsler scale and is meant to assess the intelligence of children between 6 and 16 years of age. The standardization sample matched the 1988 U.S. Census data on such variables as "age, gender, race/ethnicity, geographic region, and parent education" (Wechsler, 1991, p. 20). In addition, 7% of the standardization sample had special needs (learning problems, speech/language difficulties, emotional disturbance, physical impairment) and 5% were gifted and in programs for the talented. The WISC-III has excellent psychometric properties (Sattler, 1992). Wechsler (1991) reported internal consistency coefficients of .89 or above and test-retest reliability of .90 on the Full Scale IQ (.92 on the Verbal Scale and .86 for the Performance Scale). The WISC-III would appear to have adequate concurrent and construct validity (Sattler, 1992). In addition, a correlation of .74 was found between the Full Scale IQ of the WISC-III and the General Purpose Abbreviated Battery of the Stanford-Binet IV (Carvajal et al., 1993). A short form, composed of the Information, Vocabulary, Picture Completion, and Block Design subtests was found by Sattler (1992) to correlate highly with the Full Scale IQ ( $r = .89$ ) and to show high reliability ( $r = .94$ ). Deviation Quotients



can be calculated from results on the short form (Sattler, 1992). Because intellectual functioning has been studied in the targeted population to some extent (although not with the WISC-III), it was felt that the short form of the test would be sufficient to obtain data on the group's intellectual level. In addition, the Digit Span subtest of the WISC-III (reliability, .73; correlation with Full Scale IQ, .43; Sattler, 1992) was administered to measure short-term auditory memory and attention in the population with moderate visual impairment. Simple memory capabilities have often been found to be a strength in children who are totally blind (Hull & Mason, 1995; Warren, 1994). Children with some remaining vision may (Dekker & Koole, 1992) or may not (Hull & Mason, 1995) have a similar proficiency.

The Wechsler Individual Achievement Test (WIAT); The Psychological Corporation, 1992). The WIAT was published in 1992 and assesses the academic functioning of children and adolescents from 5 to 19 years of age. Like the WISC-III, it was standardized on a population that matched the 1988 U.S. Census data. A portion of these children (1118 children) were also part of the WISC-III standardization sample, allowing a linkage between ability and achievement scores. The WIAT offers an assessment in the following areas: Basic Reading, Mathematics Reasoning, Spelling, Reading Comprehension, Numerical Operations, Listening Comprehension, Oral Expression, and Written Expression. A

short form (Screeners) permits a quick assessment of the child's level of functioning in reading, mathematics, and spelling and was used during the present study. Reliability coefficients (The Psychological Corporation, 1992) have been reported for the Screeners ( $r = .96$ ) and for each of the subtests: Basic Reading ( $r = .92$ ), Mathematics Reasoning ( $r = .89$ ), and Spelling ( $r = .92$ ). Test-retest stability was obtained at five grade levels, including Grade 5 (range of .89 to .95 for the three subtests, and  $r = .97$  for the Screeners), Grade 8 (range of .89 to .95 for the three subtests, and  $r = .96$  for the Screeners), and Grade 10 (range of .89 to .94 for the three subtests and  $r = .95$  for the Screeners). Since the Basic Reading subtest assesses individual word reading ability only, the Reading Comprehension subtest was also offered to more fully determine the children's ability to respond to questions relating to full sentences and paragraphs. The following psychometric information (The Psychological Corporation, 1992) was offered on the Reading Comprehension subtest: reliability coefficient of .88 (average across the various age groups), test-retest coefficient of .85 for Grade 5, .83 for Grade 8, and .85 for Grade 10. WIAT authors reported adequate concurrent and construct validity in the manual.

The Woodcock Reading Mastery Tests - Revised (WRMT-R; Woodcock, 1987). The WRMT-R is a revision of the 1973 Woodcock Reading Mastery Tests and is meant to assess

various components of reading skills in children and adults (grade levels kindergarten to college senior). The normative sample for the WRMT-R was comprised of 6,089 individuals from 60 geographically diverse areas of the United States of America following the 1980 U.S. Census. Of that number, 4,201 were of school age, from kindergarten to grade 12. Form G of the WRMT-R offers an assessment in the following areas: readiness (Visual-Auditory Learning and Letter Identification), basic skills (Word Identification and Word Attack), and reading comprehension (Word Comprehension and Passage Comprehension) as well as a Supplementary Letter Checklist. Raw scores can be translated into grade and age equivalent scores, standard scores, and percentile ranks. Five cluster scores can be calculated: Readiness, Basic Skills, Reading Comprehension, Total Reading - Full Scale, Total Reading - Short Scale. Form H is comprised of four subtests with items similar to the four subtests measuring basic skills and reading comprehension.

Woodcock (1987) reported median split-half reliability coefficients ranging from .84 to .98 for Forms G or H. Construct validity data are reported for the WRMT (1973) and a number of other reading tests (range between .78 and .92) but not for the revised version of the WRMT.

In the present study, only the subtest Word Attack was administered to obtain a measure of basic reading ability

when word meaning, familiarity, and content clues have been removed. The task requires participants to read nonsense words or low-frequency words in the English language. Woodcock (1987) reported a median reliability coefficient of .87 for the Word Attack subtest (range of .81 to .94). Siegel, Share, and Geva (1995) interpreted scores on Word Attack as reflecting phonological processing skills, "the understanding of the correspondence between letters and their sound" (p. 250).

The Piers-Harris Self-Concept for Children. The Piers-Harris (Piers & Harris, 1969; The Way I Feel About Myself) attempts to measure how a child/adolescent feels about him/herself. It is composed of 80 statements to which the individual responds by circling Yes or No. It was standardized on 1,183 children from grade four to 12 in one school district of Pennsylvania. The measure has not been renormed since 1969 but research over the years has supported its value as a measure of children's self-concept (Ninth Mental Measurement Yearbook, 1985). A total score as well as six factor scores are computed. The total score (possible range of 0 to 80) is converted to a percentile score and a normalized T-score. Scores at or below the 16th percentile are reported to reflect low self-esteem while scores at or above the 84th percentile suggest high self-esteem. The six domains are: Behavior; Intellectual and School Status; Physical Appearance and Attributes; Anxiety;

Popularity; Happiness and Satisfaction. Piers published a revised manual in 1984 which included information about two new subscales: Response Bias Index and Inconsistency Index, which check for response set and random responding. Piers also reported on recent reliability studies which included test-retest correlations (range of .42 to .96, with a mean of .73), and internal consistency coefficients ranging from .88 to .93 when administered to various groups of children. Moderate correlations were reported with other measures of self-concept (.85 with the Coopersmith's Self-Esteem Inventory; .51 and .61 with the Tennessee Self-Concept Scale administered to grade 10 boys and girls). The Piers-Harris is considered to be psychometrically adequate (Chiu, 1988; Ninth Mental Measurement Yearbook, 1985). While factor-analytical studies have sometimes obtained inconsistent results when looking at item loading on the subscales (Witt, Heffer, & Pfeiffer, 1990), three of the factors have consistently emerged: Behavior, Intellectual/School Status, and Physical Appearance/Attributes (Harter, 1990). The present study sought to obtain an overall index of the self-concept of the children/adolescents as well as to procure indications on self-evaluation as they pertained to physical attributes since in some visual conditions, the individual's eyes may actually look different and move differently. Perceptions about one's school and intellectual competencies were also of interest. The Piers-Harris was reported to be

an adequate measure of these constructs (Harter, 1990). Table 7 presents the various measures to be used in the present study.

Personal Interests and Concerns Interview (PICI).

Items from the Piers-Harris do not specifically address the issue of having a visual impairment and, therefore, do not offer the means of collecting data on its impact, if any, on how the child/adolescent feels about him/herself. To present an opportunity to address the issue of visual impairment, after the children and adolescents had completed the battery of tests offered, they were asked by the examiner to answer questions on their likes and dislikes, a particular wish they had, and whether they felt different or special (Appendix E). The examiner asked the questions and recorded the responses given since some children/adolescents did not have the necessary writing skills to answer the questions independently. In addition, the examiner had the opportunity to immediately clarify ambiguous responses. For example, when a child indicated that he/she wished for a million dollars, it was possible to clarify why this would be seen as desirable. The present open-ended format of the questions was intentionally created in such a way as to allow the child/adolescent the opportunity to express whether or not he/she felt that the visual impairment was an important component of his/her self-identity. If, on the other hand, the child/adolescent

Table 7

Measures, Variables, and Range of Scores

Measures	Level of Measure	Range of Standard Scores
PLVT	continuous	0.10 - 0.29
WISC-III: DQ	continuous	44-145
Information	continuous	1-19
Vocabulary	continuous	1-19
Picture Completion	continuous	1-19
Block Design	continuous	1-19
Digit Span	continuous	1-19
WIAT		
Basic Reading	continuous	61-145
Math Reas.	continuous	58-160
Spelling	continuous	60-160
Read. Comp.	continuous	61-160
WRMT-R: Word Attack	continuous	10-175
Piers-Harris		
Total Score	continuous	25-81
Behaviour	continuous	13-67
Int./School	continuous	13-70
Physical App.	continuous	23-72

did not perceive the visual impairment to be central to how he/she defined him/herself, the child/adolescent could then respond to the interview in terms of issues that were relevant to the self.

Demographic and History Questionnaire: Parent. While the child/adolescent worked on the various tasks outlined, parents, usually the mother, completed a questionnaire which included demographic data as well as information on the presence of significant eye problems in other family members (Appendix B). The questionnaire next focused on the child's low vision history: initial signs of visual impairment, age at diagnosis, specific eye condition, as well as the absence/presence of other handicapping conditions, that is, hearing impairment, motor impairment. An educational intervention history was sought next to determine the amount and kind of specialized intervention received at the pre-school and school-age level, and the present school placement.

#### Procedure

The battery of tests chosen for the present study was administered by the researcher in a quiet setting, the exact location of which depended on the child's particular situation and what was available in the child's/adolescent's community. The test administration was conducted in a quiet room in the child's family home (kitchen or dining room), or in a public building where a quiet room was available.



The goals of the study were described to the children and their parents and they were told they could stop at any time during the procedure. The parents and children read and signed the informed consent and assent forms (Appendix F) before starting the procedure. The assent form was read aloud as the children read along and terms were further explained when necessary to maximize understanding. The participants were first given the Pediatric Low Vision Test. The children/adolescents were then administered the short form of the WISC-III, the Screener as well as the Reading Comprehension subtest from the WIAT, the Word Attack subtest of the WRMT-R, and the Piers-Harris. Administration conformed to standardized directives. The order of presentation of these four measures was determined by referring to a table of random numbers. When they had completed the other measures, the participants were asked to answer questions about their interests and concerns. The testing period lasted about 2 hours (from 1.5 to 2.5 hours). No participant asked to stop before all the measures were completed.

Parents were asked to complete the questionnaire on their child's medical, developmental, and educational history while their child was completing the battery of tests. It took parents about 20 minutes to complete this form.

## CHAPTER III

### RESULTS

#### Overview of Analyses

Analyses included intercorrelations and univariate analyses (e.g., t-tests, between groups repeated measures ANOVA, multiple regression, Chi-Square Goodness-of-Fit Test, Wilcoxon-Mann-Whitney test, Friedman Two-way Analysis of Variance by Ranks). The independent variable was the absence (moderate visual impairment **without** other handicaps; MVI) or the presence (moderate visual impairment **with** other handicaps; MVI+) of other handicaps in addition to the visual impairment. The dependent variables included: (a) the five subtests of the Wechsler Intelligence Scale for Children (WISC-III); (b) the Developmental Quotient (DQ; composite of four subtests) of the WISC-III; (c) the four subtests of the Wechsler Individual Achievement Test (WIAT) and the subtest Word Attack of the Woodcock Reading Mastery Tests-Revised; (d) the score for the Screener (composite of three subtests) of the WIAT; (e) the subscales of the Piers-Harris Self-Concept Test for Children; and (f) the Total Score of the Piers-Harris. All analyses were computed using SPSS for Windows (Norusis, 1993).

Preliminary analyses were conducted to obtain information on the descriptive properties (means, standard

deviations) of the variables. Such analyses suggested that the smaller group (MVI+;  $n = 16$ ) had greater variance than the other group (MVI;  $n = 31$ ) on a number of variables (Developmental Quotient, Picture Completion, WIAT Screener, Spelling, Word Attack), rendering an omnibus test to compare the two groups inappropriate (Tabachnick & Fidell, 1989). Therefore, the two groups were compared using a variety of univariate tests.

The first hypothesis proposed that the intellectual performance of the two groups of children with MVI (**without** and **with** other handicaps) would be different. A between groups repeated measures ANOVA was computed to determine whether there was a difference in performance on the five subtests of the WISC-III by the two groups. Using the Chi-Square Goodness of Fit Test, the distribution of scores for Developmental Quotient (DQ) categories was compared to the distribution of scores for the standardization sample of the WISC-III.

To test the second hypothesis which concerned the academic performance of the two groups, a similar approach was taken. First, a between groups repeated measures ANOVA was computed to determine whether there was a difference in performance on the four subtests of the WIAT and Word Attack by the two groups. The distribution of scores on the Screener (composite of three subtests) for each group was compared to the distribution of scores for the

standardization sample of the WIAT using the Chi-Square Goodness of Fit Test.

The third hypothesis focused on the self-esteem of the children. First, a between groups repeated measures ANOVA was computed to compare the two groups on the six subscales of the Piers-Harris. Regression analyses were completed to investigate the hypothesis that the overall self-esteem and subscales scores of children with moderate visual impairment (both **without** and **with** other handicaps) would be predicted from age, sex, intelligence, academic performance, as well as degree of visual impairment and the presence of other handicaps.

Finally, the fourth hypothesis explored various experiences of children with moderate visual impairment using an open format questionnaire. Responses to questions during the interview were divided into relevant categories and frequencies of categories were computed in terms of percentages.

#### Preliminary Analyses

As outlined above, preliminary analyses were completed to scrutinize each subtest and total score variable for missing data, normality of distribution, and violations of assumptions of multivariate analyses. Because of administration error, the score on the subtest Digit Span of the WISC-III was missing for one participant. The missing datum was replaced using the mean score of that subtest for

the participant's group (Tabachnick & Fidell, 1989).

Descriptive statistics for a number of demographic variables are presented in Table 8. There were no significant differences between the two groups (MVI, MVI+) in terms of age, visual acuity readings by the experimenter, visual acuity readings by the children's eye specialists, and socioeconomic status. For the variable age at diagnosis, a diagnostic test (Levene's Test for Equality of Variance,  $F = 27.73$ ,  $p < .0005$ ) proved significant. Because the variances for the two groups on this variable departed substantially from homogeneity, it was necessary to compare them using a non-parametric test. The age at diagnosis for both groups were combined and ranked and the Wilcoxon-Mann-Whitney test indicated that the difference in mean ranks between the two groups was significant:  $U = 140.0$ ,  $p = .0297$ . The visual impairment was diagnosed at an earlier age for the group without other handicaps (before age one:  $M = .89$ ,  $SD = 1.29$ ) than for the group with other handicaps (between ages 2 and 3:  $M = 2.81$ ,  $SD = 2.78$ ).

Initial screening of the data revealed that a number of variables did not meet assumptions of normality that are necessary for a number of parametric tests: Degree of Visual Impairment ( $M = .20$ ,  $SD = .21$ ; skewness  $z = 8.06$ ,  $p < .00003$ ; kurtosis  $z = 11.40$ ,  $p < .00003$ ); Developmental Quotient of the WISC-III ( $M = 90.47$ ,  $SD = 22.44$ ; skewness  $z = -1.68$ ,  $p = .05$ ); subtests of the WIAT: Mathematics

Table 8

Means and Standard Deviations of Demographic Variables

Variables	Groups			
	MVI <u>n</u> = 31	MVI+ <u>n</u> = 16	<u>t</u>	<u>p</u>
Age	11.97 (2.33)	12.44 (2.34)	.65	.52
Visual acuity scores (present study)	.21 (.24)	.19 (.15)	-.34	.74
Visual acuity scores (eye specialist)	.26 (.23)	.25 (.18)	-.23	.82
SES <sup>a</sup>	43.01 (10.77)	41.52 (13.33)	-.42	.70

<sup>a</sup> Blishen, Carroll, & Moore, 1987.

Note. MVI = moderate visual impairment without other handicaps; MVI+ = moderate visual impairment with other handicaps.

Reasoning ( $\bar{M} = 90.81$ ,  $SD = 17.49$ ; skewness  $z = -1.93$ ,  $p = .03$ ) and Reading Comprehension ( $\bar{M} = 88.13$ ,  $SD = 18.97$ ; skewness  $z = -2.15$ ,  $p = .02$ ); Word Attack of the Woodcock Reading Mastery Tests - Revised ( $\bar{M} = 85.98$ ,  $SD = 21.74$ ; skewness  $z = -2.87$ ,  $p = .002$ ); subscales of the Piers-Harris: Behavior ( $\bar{M} = 6.19$ ,  $SD = 1.96$ ; skewness  $z = 2.11$ ,  $p = .02$ ) and Happiness/Satisfaction ( $\bar{M} = 6.19$ ,  $SD = 2.19$ ; skewness  $z = -2.67$ ,  $p = .004$ ).

With regard to the degree of visual impairment, Ferris, Kasso, Bresnick and Bailey (1982) have drawn attention to the inconsistency in progression from one line of stimuli to another in most Snellen-like visual acuity charts (including the PLVT) and have noted that charts built on a logarithmic scale show regular and equal progression. They offered a table of logarithm equivalents for most visual acuity ratios. For the visual acuities readings not included in the chart provided and obtained in the present study, a similar logarithmic transformation was performed. This resulted in a new mean of .84 ( $SD = .33$ ) and in an improvement in skewness ( $z = -1.28$ ,  $p = .10$ ) and kurtosis ( $z = 2.04$ ,  $p = .02$ ). The resulting scores were used for all subsequent analyses of the variable identified as Degree of Visual Impairment-Logarithmic Transformation (DVI-LT). With this variable, scores ranged from zero to 2.74, with the larger numbers representing poorer visual acuities. A decision was made to not transform the other variables

because data interpretation would then have been less clear. It was deemed necessary therefore to analyze the data using a combination of parametric and non-parametric tests. Because of the relatively small number of participants and to protect against Type II error (Tabachnick & Fidell, 1989), corrections for multiple comparisons were not applied. The alpha level was set at .05 for all statistical tests, but results with an alpha level of at least .01 were considered more robust and interpreted with greater confidence.

More boys ( $n = 30$ ; 64%) than girls ( $n = 17$ ; 36%) participated in the study. These proportions are similar to those reported in a study reviewed previously (Daugherty & Moran, 1982) in which 63% of the sample were boys. The MVI group (20 males and 11 females) and the MVI+ group (10 males and six females) were not significantly different in terms of proportion of participants of both sex: Pearson  $X^2 (1) = .02$ ,  $p = .89$ .

The initial visual acuity readings obtained during the present study were compared to the visual acuity readings obtained by ophthalmologists or optometrists available on 43 of the participants. The correlation between the two acuity readings was  $r (43) = .80$ ,  $p < .0005$ . Because of extensive skewness and kurtosis of the data, a logarithmic transformation was completed on the two visual acuity variables. The correlation between the transformed acuity



measures was  $r(43) = .58, p < .0005$ .

A correlation between age at diagnosis and degree of visual impairment-LT was computed and proved significant:  $r(46) = -.34, p = .02$ . Children with a more severe visual impairment were identified at an earlier age than children with a less severe visual impairment.

### Hypothesis I

This hypothesis addressed the issue of intellectual functioning in the two groups of children with a moderate visual impairment, one **without** other handicaps and one **with** other handicaps. Information gained concerning Hypothesis I is presented in three sections: (1) descriptive statistics and between groups repeated measures ANOVA; (2) comparisons of the two groups to the standardization sample of the WISC-III; and (3) separate intercorrelations of the variables age, degree of visual impairment-LT, and the subtests of the WISC-III for the two groups of children (MVI, MVI+).

Descriptive Statistics. Means and standard deviations on the five subtests and the Deviation Quotient of the WISC-III obtained by the group **without** other handicaps (MVI;  $n = 31$ ) and the group **with** other handicaps (MVI+;  $n = 16$ ) are presented in Table 9. The DQ for the standardization sample of the WISC-III has a mean of 100 and a standard deviation of 15, while the subtests have a mean of 10 and a standard deviation of three. The mean for the MVI group reflected intellectual functioning in the average range,

Table 9

Means and Standard Deviations obtained on the WISC-III by  
the Two Groups

Variables	Groups	
	MVI <u>n</u> = 31	MVI+ <u>n</u> = 16
Information	9.10 (2.90)	6.00 (3.52)
Vocabulary	9.81 (3.23)	5.63 (3.77)
Digit Span	10.00 (4.19)	6.06 (3.36)
Picture Completion	9.42 (3.15)	5.88 (4.11)
Block Design	11.42 (3.94)	5.19 (3.94)
Deviation Quotient	99.52 (16.89)	72.94 (21.82)

Note. MVI = Moderate visual impairment without other  
handicaps; MVI+ = Moderate visual impairment with other  
handicaps.

while the mean for the MVI+ group was in the borderline range of intellectual functioning (between one and two standard deviations below the mean).

A between groups repeated measures ANOVA (2 X 5 factorial design) was computed to evaluate the differences in scores obtained on the five subtests of the WISC-III by the two groups (MVI, MVI+). As expected, a significant difference was found between the two groups:  $F(1, 45) = 23.76, p < .0005$ . While the within-subject effect (performance on the five subtests) was not significant,  $F(4, 180) = .64, p = .63$ , the interaction between groups and within-subject factors was found to be significant,  $F(4, 180) = 2.42, p = .05$ .

While t-tests for paired samples did not reveal significant differences in performance on the WISC-III subtests for the MVI+ group, significant differences were found for the MVI group. Specifically, there was a significant difference between Block Design ( $M = 11.42, SD = 3.94$ ) and three other subtests: Information ( $M = 9.10, SD = 2.90$ ),  $t(30) = 4.44, p < .0005$ ; Vocabulary ( $M = 9.81, SD = 3.23$ ),  $t(30) = 2.61, p = .01$ ; and Picture Completion ( $M = 9.42, SD = 3.15$ ),  $t(30) = 3.01, p = .005$ .

A between groups repeated measures ANOVA (2 X 5 factorial design) was computed to compare the performance of boys and girls on the five subtests of the WISC-III. Neither the effect of the between groups factor (sex;  $F(1,$

45) = .06,  $p = .81$ ), nor that of the within-groups factor (five subtests;  $F(4, 180) = 1.47$ ,  $p = .21$ ) was significant. The interaction between the groups and the within-subjects factors was also not significant,  $F(4, 180) = .44$ ,  $p = .78$ .

Comparisons with the Standardization Sample. The Chi-Square Goodness-of-Fit Test was performed on the distribution of DQ scores for each of the two groups to determine if the results obtained were different from the distribution of scores for the standardization sample of the WISC-III. Information from the standardization sample of the WISC-III was used to compute the expected frequencies (Wechsler, 1991). Table 10 summarizes the frequency of DQ's within each category for the MVI group. With four categories (<85; 85-99; 100-114; >114), the distribution of DQ scores for the MVI group without other handicaps was not significantly different from the distribution of DQ scores obtained with the standardization sample:  $X^2(3, n = 31) = .05$ ,  $p = .9973$ .

The group with other handicaps contained a smaller number of participants. With four categories, expected frequencies for two categories (DQ below 85 and above 114) would have been less than five, rendering the results of the Chi-Square Goodness-of-Fit test questionable (Siegel & Castellan, 1988). It was therefore necessary to reduce the categories to two: less than 100; and, 100 and above. Table 11 summarizes the frequency of DQ's within each category for

Table 10

Frequencies of Developmental Quotients (DQ) on the WISC-III  
obtained by the Group with Moderate Visual Impairment  
without Other Handicaps

	DQ categories				Total
	<85	85-99	100-114	>114	
obtained	5	11	10	5	31
expected	5	10.5	10.5	5	

$$X^2 (3, n = 31) = .05, p = .9973.$$

Table 11

Frequencies of Developmental Quotients (DQ) on the WISC-III  
obtained by the Group with Moderate Visual Impairment with  
Other Handicaps

	DQ categories		
	<100	100 and >100	Total
obtained frequencies	14	2	16
expected frequencies	8	8	

$X^2 (1, n = 16) = 9.0, p = .0027.$

the MVI+ group. The DQ for the MVI **with** other handicaps group was found to be significantly different from the results of the standardization sample:  $X^2 (1, n = 16) = 9.0$ ,  $p = .0027$ , with more obtained DQs in the category below 100 than expected.

Intercorrelations among the Variables Degree of Visual Impairment-LT, and the WISC-III. Table 12 presents the two-tailed Pearson correlations among the variables degree of visual impairment-LT, the DQ and the five subtests of the WISC-III for each group (MVI, MVI+). Degree of visual impairment-LT had a differential effect for each group on the subtests Vocabulary, Digit Span, Block Design, Picture Completion, as well as on the composite DQ. For the MVI group, as the degree of visual impairment increased, performance on Picture Completion decreased significantly. While there was no significant correlation between degree of visual impairment-LT and the overall DQ for the MVI group, the corresponding correlation for the MVI+ group was significant. Within the group **with** other handicaps (MVI+), performance on the subtests Vocabulary, Digit Span, Block Design was poorer with greater visual impairment. Intercorrelations among the five subtests on the WISC-III presented different patterns for the two groups (MVI, MVI+). The correlations for the MVI group were not significantly different from those obtained with the standardization sample of the WISC-III. For the MVI+ group,

Table 12

Intercorrelations among the Variables Degree of Visual Impairment-LT, Developmental Quotient and Subtests of the WISC-III for the Two Groups: MVI (n = 31) and MVI+ (n = 16)

Variables	Variables						
	DVI-LT	DQ	INF	VOC	DS	PC	BD
DVI-LT	<u>1.00</u>	<b>-.62*</b>	-.49	<b>-.71**</b>	<b>-.63**</b>	-.44	<b>-.62*</b>
DQ	-.02	<u>1.00</u>	<b>.91***</b>	<b>.94***</b>	<b>.69**</b>	<b>.86***</b>	<b>.93***</b>
INF	.13	<b>.84***</b>	<u>1.00</u>	<b>.89***</b>	<b>.52*</b>	<b>.64**</b>	<b>.80***</b>
VOC	.06	<b>.82***</b>	<b>.67***</b>	<u>1.00</u>	<b>.64**</b>	<b>.71**</b>	<b>.84***</b>
DS	-.04	.29	.30	.29	<u>1.00</u>	<b>.59*</b>	<b>.76**</b>
PC	<b>-.39*</b>	<b>.72***</b>	<b>.41*</b>	<b>.47**</b>	.10	<u>1.00</u>	<b>.73**</b>
BD	.11	<b>.86***</b>	<b>.68***</b>	<b>.55**</b>	.24	<b>.47**</b>	<u>1.00</u>

\*p<.05. \*\*p<.01. \*\*\*p<.001.

Note. DVI-LT = degree of visual impairment-logarithmic transformation; DQ = developmental quotient; INF = information; VOC = vocabulary; DS = digit span; PC = picture completion; BD = block design. MVI = moderate visual impairment without other handicaps; MVI+ = moderate visual impairment with other handicaps. Correlations for MVI+ are above the diagonal; correlations for MVI are below the diagonal.



a number of correlations were significantly higher than the correlations obtained with the standardization sample: Vocabulary and Information (WISC-III,  $r$  (2200) = .70; MVI+,  $r$  (16) = .89;  $z$  = 2.00,  $p$  = .02), Block Design and Information (WISC-III,  $r$  (2200) = .48; MVI+,  $r$  (16) = .80;  $z$  2.07,  $p$  = .0192), Block Design and Vocabulary (WISC-III,  $r$  (2200) = .46; MVI+,  $r$  (16) = .84;  $z$  = 2.60,  $p$  = .0047), and Block Design and Digit Span (WISC-III,  $r$  (2200) = .32; MVI+,  $r$  (16) = .76;  $z$  = 2.39,  $p$  = .0084). The high correlations for the MVI+ group would appear to reflect more consistent performance across tasks by this group.

### Summary

The results of the between groups repeated measures ANOVA and the Chi-Square Goodness-of-Fit test confirmed Hypothesis I. The MVI group demonstrated ability levels consistent with the normative sample of the WISC-III, with a mean DQ score within the average range of intellectual functioning. Also consistent with the hypothesis, the DQ scores for the MVI+ group were significantly lower than for the MVI group, with a mean DQ score within the borderline range of intellectual functioning. Within the MVI group, greater visual impairment was linked with poorer performance on Picture Completion. In addition, performance of the MVI group on the subtest Block Design was found to be significantly higher than on three of the other subtests: Information, Vocabulary, and Picture Completion. For the

MVI+ group, there was no significant difference in performance on the five subtests. With increased visual impairment, performance on Vocabulary, Digit Span, Block Design, and the composite DQ significantly decreased. When the total group of participants was compared by sex on the subtests of the WISC-III, no significant differences were found. While the intercorrelations between variables for the MVI group were similar to those obtained by the standardization sample of the WISC-III, some of the intercorrelations for the MVI+ group were of greater magnitude than those of the standardization sample and reflected more uniform levels of performance on the tasks administered.

### Hypothesis II

This hypothesis addressed the academic performance of the two groups of children (MVI, MVI+). Information gained concerning Hypothesis II will be presented in four sections: (1) descriptive statistics, between groups repeated measures ANOVA, Wilcoxon-Mann-Whitney Test, and Friedman Two-way Analysis of Variance by Ranks; (2) comparisons of the two groups with the standardization sample; (3) comparisons of the overall results on the academic achievement measure (WIAT Screener) and on the intellectual measure (DQ of the WISC-III); and (4) correlation matrix of variables for the two groups of children (MVI, MVI+).

Descriptive Statistics. Means and standard deviations

on the four subtests and the WIAT Screener obtained by the group without other handicaps ( $n = 31$ ) and the group with other handicaps ( $n = 16$ ) are presented in Table 13. For the standardization sample of the WIAT, the Screener and the subtests have a mean of 100 and a standard deviation of 15 (The Psychological Corporation, 1992). The results for the MVI group were within one standard deviation from the mean of the standardization sample, while the results for the MVI+ were between one and two standard deviations below the same mean.

A between groups repeated measures ANOVA (2 X 5 factorial design) was computed to evaluate the differences in scores obtained on the five academic subtests (four subtests of the WIAT and the subtest Word Attack) by the two groups (MVI, MVI+). A univariate diagnostic test revealed that scores on the subtest Word Attack did not demonstrate homogeneity of variance (Cochran's  $C = .74$ ,  $p = .01$ ). In addition, the multivariate diagnostic indicator, Box's  $M$  test, suggested that the assumption of homogeneity of the variance-covariance matrices was not being met when the between groups factor and the within-subjects factor were combined:  $F (15, 3775) = 2.15$ ,  $p = .006$ . It was therefore necessary to continue analyzing the data using nonparametric means. The scores on the Screener for both groups ( $N = 47$ ) were combined and ranked. The Wilcoxon-Mann-Whitney test indicated that the difference in mean ranks between the two

Table 13

Means and Standard Deviations obtained on the WIAT by the  
Two Groups

Variables	Groups	
	MVI <u>n</u> = 31	MVI+ <u>n</u> = 16
Basic Reading	93.32 (16.96)	77.87 (18.96)
Math Reasoning	97.19 (14.02)	78.44 (17.24)
Spelling	92.13 (15.57)	78.56 (22.41)
Reading Comprehension	95.10 (14.70)	74.63 (19.41)
Screeners	92.52 (16.72)	73.88 (20.83)
Word Attack	92.90 (15.41)	72.56 (26.14)

Note. MVI = moderate visual impairment without other handicaps; MVI+ = moderate visual impairment with other handicaps.

groups on the WIAT Screener was significant:  $U = 118.0$ ,  $p = .0035$ . Friedman Two-way Analysis of Variance by Ranks was performed on the five academic subtests (compares scores within groups only) and revealed that the difference in mean ranks between the subtests was not significant for either the MVI group ( $X^2 [4, n = 31] = 4.65$ ,  $p = .32$ ) or for the MVI+ group ( $X^2 [4, n = 16] = 2.64$ ,  $p = .62$ ).

A between groups repeated measures ANOVA (2 X 5 factorial design) was computed to compare girls and boys on the five academic subtests (four subtests of the WIAT and Word Attack). The between group factor (sex),  $F (1, 45) = .17$ ,  $p = .68$ , and the within-subject factor (five subtests),  $F (4, 180) = .84$ ,  $p = .50$ , were not significant. On the other hand, the interaction between sex and the academic subtests was significant:  $F (4, 180) = 4.50$ ,  $p = .002$ . T-tests for paired samples were performed to compare results on the subtests within each group. No significant differences were found for the group of girls ( $n = 17$ ). For the group of boys, however, scores on Mathematics Reasoning ( $M = 93.07$ ,  $SD = 17.81$ ) were found to be significantly different from scores on a number of other subtests: Basic Reading ( $M = 87.30$ ,  $SD = 19.83$ ),  $t (29) = 2.15$ ,  $p = .04$ ; Spelling ( $M = 85.37$ ,  $SD = 19.37$ ),  $t (29) = 2.70$ ,  $p = .01$ ; Reading Comprehension ( $M = 86.97$ ,  $SD = 21.05$ ),  $t (29) = 3.18$ ,  $p = .004$ ; and Word Attack ( $M = 83.70$ ,  $SD = 23.46$ ),  $t (29) = 3.17$ ,  $p = .004$ . For boys, there was also a

significant difference between the subtest Basic Reading ( $\bar{M}$  = 87.30,  $SD$  = 19.83) and Word Attack ( $\bar{M}$  = 83.70,  $SD$  = 23.46),  $t$  (29) = 2.05,  $p$  = .05.

The group of boys was further subdivided by absence/presence of other handicaps (MVI,  $n$  = 20; MVI+,  $n$  = 10) and  $t$ -tests for paired samples were completed. For the MVI boys, the difference between Mathematics Reasoning ( $\bar{M}$  = 100.05,  $SD$  = 15.12) and Spelling ( $\bar{M}$  = 90.30,  $SD$  = 18.05), and between Mathematics Reasoning ( $\bar{M}$  = 100.05,  $SD$  = 15.12) and Word Attack ( $\bar{M}$  = 91.90,  $SD$  = 16.59) were found to be significant:  $t$  (20) = 3.06,  $p$  = .006; and  $t$  (20) = 2.61,  $p$  = .017, respectively. For the MVI+ boys, the difference between Mathematics Reasoning ( $\bar{M}$  = 79.10,  $SD$  = 14.66) and Reading Comprehension ( $\bar{M}$  = 70.10,  $SD$  = 17.49) proved significant,  $t$  (10) = 2.79,  $p$  = .021.

Comparisons with the Standardization Sample. The Chi-Square Goodness-of-Fit Test was performed on the distribution of scores for the Screener for each of the two groups (MVI, MVI+) to determine if the results obtained were different from the standardization sample of the WIAT. Information from the standardization sample of the WIAT (The Psychological Corporation, 1992) was used to compute the expected frequencies. Table 14 summarizes the frequency of the scores on the Screener within each category for the MVI group. With four categories (<85; 85-99; 100-114; >114), the distribution of scores on the Screener for the MVI group

Table 14

Frequencies of Scores on the WIAT Screener obtained by the  
Group with Moderate Visual Impairment without Other  
Handicaps

	Categories of scores on Screener				Total
	<85	85-99	100-114	>115	
obtained	12	7	10	2	31
expected	5	10.5	10.5	5	

$X^2 (3, n = 31) = 12.79, p = .0051.$

without other handicaps was significantly different from the distribution of scores obtained with the standardization sample of the WIAT:  $X^2 (3, n = 31) = 12.79, p = .0051$ .

The group with other handicaps contained a smaller number of participants. With four categories, expected frequencies for two categories (score below 85 and above 114) would have been less than five, rendering the results of the Chi-Square Goodness-of-Fit test questionable (Siegel & Castellan, 1988). As for the comparison of this group to the standardization sample of the WISC-III, it was necessary to reduce the categories to two: less than 100; and, 100 and above. Table 15 summarizes the frequency of scores on the Screener within each category for the MVI+ group. Using two categories, the distribution of scores on the Screener for the MVI group with other handicaps was found to be significantly different from the distribution of scores obtained with the standardization sample of the WIAT:  $X^2 (1, n = 16) = 12.25, p = .0005$ , suggesting that a greater number of participants in this group than expected obtained scores below 100 on the academic screening measure.

#### Comparisons of Intellectual and Academic Performance.

A t-test for paired samples was completed to compare the DQ and the Screener score for the group without other handicaps (MVI). Results revealed that the difference between the intellectual score and the academic score was significant ( $t (30) = 2.92, p = .007$ ), with results on the Screener ( $M =$



Table 15

Frequencies of Scores on the WIAT Screener obtained by the  
Group with Moderate Visual Impairment with Other Handicaps

	Categories of scores on Screener		
	<100	100 and >100	Total
obtained frequencies	15	1	16
expected frequencies	8	8	

$X^2 (1, n = 16) = 12.25, p = .0005.$

92.52, SD = 16.72) lower than on the DQ (M = 99.52, SD = 16.89).

The WIAT manual (The Psychological Corporation, 1992) contains tables that allow a comparison between predicted (from DQ; Table C.1, p. 346) and obtained scores on the academic subtests. The predicted and obtained scores for each MVI participant on the four subtests of the WIAT were calculated and the significance of the discrepancies were determined from Table C.4 (p. 352). Of the 31 MVI participants, 15 (48%) demonstrated performances significantly below expectations on one (6/15), two (1/15), three (7/15), or all four (1/15) of the subtests. An additional participant obtained mixed results: significantly above expectations on one subtest and significantly below expectations on two others. The remaining 15 participants showed no academic delays: 4 scored above expectations on one or two subtests and another 11 (35%) performed as expected when DQ scores were taken into consideration. T-tests for independent means were computed on a number of variables (i.e., age, age at diagnosis, degree of visual impairment-LT, SES, WISC-III DQ, Digit Span, Word Attack, Total Score on the Piers-Harris, Intellectual and School Status subscale) to compare the children who presented with delays (n = 15) and those who did not (n = 15). Three variables were found to differentiate the group that demonstrated academic delays from the group that did not:

scores on Digit Span, scores on Word Attack, and SES. The children who showed delays had lower scores on Digit Span ( $M = 7.00$ ,  $SD = 2.65$ ) than the group of children who did not ( $M = 12.80$ ,  $SD = 3.45$ ),  $t(28) = -5.17$ ,  $p < .0005$ . Scores on Word Attack were also lower for the group of children with delays ( $M = 83.93$ ,  $SD = 14.66$ ) than for the group of children with no delays ( $M = 103.27$ ,  $SD = 7.85$ ),  $t(28) = -4.50$ ,  $p < .0005$ . The socioeconomic status of the group showing delays ( $M = 39.36$ ,  $SD = 8.12$ ) was lower than the SES of the group showing no delays ( $M = 47.49$ ,  $SD = 11.66$ ),  $t(28) = -2.21$ ,  $p = .04$ .

Within the subset of the MVI group showing no academic delays, significant correlations were obtained between degree of visual impairment-LT and Digit Span and between degree of visual impairment-LT and Word Attack:  $r(15) = .54$ ,  $p = .04$ , and  $r(15) = .53$ ,  $p = .04$  respectively. Performance on these two subtests was higher for those children with greater visual impairment. Similar correlations between these variables were not found to be significant for the group presenting with delays.

For the group with other handicaps (MVI+), a t-test for paired samples revealed that the difference between the DQ ( $M = 72.94$ ,  $SD = 21.82$ ) and the Screener ( $M = 73.88$ ,  $SD = 20.83$ ) was not significant:  $t(15) = -.26$ ,  $p = .802$ .

Correlations among the Variables Degree of Visual Impairment-LT and Academic Tasks. Table 16 presents, for

Table 16

Intercorrelations among the Variables Degree of Visual Impairment-LT, WIAT Screener,Subtests of the WIAT and Word Attack from the Woodcock for the Two Groups: MVI (n = 31)and MVI+ (n = 16)

Variables	Variables						
	DVI-LT	SCR	B.R.	Math	Spell	R.C.	W.A.
DVI-LT	<u>1.00</u>	-.49	-.47	-.41	-.47	-.41	-.55*
SCR	.04	<u>1.00</u>	.98***	.82***	.97***	.92***	.94***
B.R.	.05	.94***	<u>1.00</u>	.70**	.97***	.90***	.96***
Math	-.01	.78***	.61***	<u>1.00</u>	.72**	.83***	.73**
Spell	.08	.91***	.83***	.55**	<u>1.00</u>	.85***	.91***
R.C.	-.03	.89***	.84***	.73***	.77***	<u>1.00</u>	.91***
W.A.	.01	.86***	.88***	.52**	.83***	.79***	<u>1.00</u>

\*p&lt;.05. \*\*p&lt;.01. \*\*\*p&lt;.001.

Note. DVI-LT = degree of visual impairment-logarithmic transformation; SCR = WIAT Screener; B.R. = basic reading; Math = mathematics reasoning; Spell = spelling; R.C. = reading comprehension; W.A. = word attack. MVI = moderate visual impairment without other handicaps; MVI+ = moderate visual impairment with other handicaps. Correlations for MVI+ group are above the diagonal; correlations for MVI group are below the diagonal.

each group, the correlations among the variables degree of visual impairment-LT, WIAT Screener, the subtests of the WIAT, and Word Attack. The degree of visual impairment-LT was not significantly correlated with any of the subtests for the MVI group, but for the MVI+ group the correlation with Word Attack proved significant. For this group, as the degree of visual impairment increased, performance on Word Attack decreased.

The WIAT manual (The Psychological Corporation, 1992) does not offer a table of correlations among subtests for the total standardization samples. For the ages 9 to 16, the intercorrelations between subtests showed the following ranges for the standardization sample of the WIAT and the following correlations for the two MVI groups: Basic Reading and Mathematics Reasoning, .56 to .72 (WIAT), .61 (MVI), and .70 (MVI+); Basic Reading and Spelling, .74 to .88 (WIAT), .83 (MVI), and .97 (MVI+); Basic Reading and Reading Comprehension, .50 to .78 (WIAT), .84 (MVI), and .90 (MVI+); Mathematics Reasoning and Spelling, .48 to .70 (WIAT), .55 (MVI), and .72 (MVI+); Mathematics Reasoning and Reading Comprehension, .55 to .75 (WIAT), .73 (MVI), and .83 (MVI+); and Spelling and Reading Comprehension, .43 to .75 (WIAT), .77 (MVI), and .85 (MVI+). Generally, the correlations for the MVI group were within the range obtained by the WIAT standardization sample, while the correlations obtained by the MVI+ group were generally higher and outside that range.

### Summary

The various analyses completed on the scores of the subtests and the composite WIAT Screener generally confirmed Hypothesis II. While the MVI group's mean overall score was within one standard deviation of the mean for the WIAT, this mean was significantly lower statistically than the DQ of the WISC-III obtained by this group. More importantly, significant discrepancies between predicted and obtained scores on one or more subtests of the WIAT were recorded with 15 of the 31 children (48%) in this group. Compared to children in the MVI group presenting with no delays, children in the MVI group who demonstrated academic delays obtained lower scores on the subtest Digit Span of the WISC-III and Word Attack of the Woodcock Reading Mastery Tests - Revised. They were also from families with lower SES than the children with no delays. While similar correlations were not significant for the subset of children in the MVI group presenting with academic delays, for the subset of children in the MVI group presenting with no delays, significant correlations were found between the degree of visual impairment and performance on Digit Span and on Word Attack with performance higher for those children with greater visual impairment.

For the MVI+ group, the results on the Screener were less than one standard deviation from the standardization mean but were not significantly different from results

obtained on the DQ of the WISC-III, reflecting consistent performance on ability and academic measures. The difference in academic performance between the MVI and MVI+ groups was significant. On the other hand, within each group, performance was consistent on the four subtests of the WIAT. When participants were divided by sex, a different pattern emerged. Overall, differences in performance between boys and girls were not found to be significant and the performance of girls was found to be consistent across the academic tasks. On the other hand, with boys, Mathematics Reasoning was found to be a relative strength, with boys from the MVI group performing better on Mathematics Reasoning than on either Spelling or Word Attack, and with boys from the MVI+ group doing better on Mathematics Reasoning than on Reading Comprehension.

Intercorrelations among variables revealed no significant relationship between degree of visual impairment-LT, and the subtests of the WIAT for the MVI group. For the MVI+ group, scores on Word Attack were lower for participants with a greater degree of visual impairment.

### Hypothesis III

In this hypothesis, the self-esteem of children with moderate visual impairment **without** and **with** other handicaps was examined. Information gained concerning Hypothesis III will be presented in three sections: (1) descriptive statistics, between groups repeated measures ANOVA,

Wilcoxon-Mann-Whitney test, and Friedman Two-way Analysis of Variance by Ranks; (2) correlation matrices of variables for the two groups of children (MVI, MVI+); and (3) four standard multiple regressions, one on the Total Score of the Piers-Harris and one each on the three subscales that have consistently emerged in factor analytic studies: Intellectual/School Status, Physical Appearance/Attributes, and Behavior.

Descriptive Statistics. Means and standard deviations on the six subscales and the Total Score of the Piers-Harris obtained by the group **without** other handicaps ( $n = 31$ ) and the group **with** other handicaps ( $n = 16$ ) are presented in Table 17. The Total Score of the standardization sample of the Piers-Harris has a mean of 50 and a standard deviation of 10 while the subscales have a mean of five and standard deviation of two. The Total Score for the MVI group was within one standard deviation from the mean of the standardization sample and reflected a "slightly above average" level of overall self-esteem (Piers, 1984). The Total Score for the MVI+ group was also within one standard deviation from the mean of the standardization sample and reflected "average" overall self-esteem (Piers, 1984). All the subscales scores for the two groups were within one standard deviation from the mean for the standardization sample.

A between groups repeated measures ANOVA (2 X 6



Table 17

Means and Standard Deviations obtained on the Subscales and the Total Score of the Piers-Harris for the Two Groups

Variables	Groups	
	MVI	MVI+
	<u>n</u> = 31	<u>n</u> = 16
Behavior	6.71 (1.66)	5.19 (2.17)
Intellectual and		
School Status	5.97 (2.11)	6.00 (1.63)
Physical Appearance	5.81 (2.04)	5.88 (2.39)
Anxiety	5.87 (2.25)	5.19 (3.02)
Popularity	4.52 (2.20)	3.69 (2.30)
Happiness and		
Satisfaction	6.48 (2.05)	5.62 (2.42)
Total Score	57.77 (10.09)	53.81 (10.55)

Note. The standardization sample of the Piers-Harris had a mean of 50 (SD = 10) for the Total Score and a mean of 5 (SD = 2) for each subscale. MVI = moderate visual impairment without other handicaps; MVI+ = moderate visual impairment with other handicaps.

factorial design) was computed to evaluate the differences in scores on the subscales of the Piers-Harris obtained by the two groups (MVI, MVI+). The difference between the two groups was not found to be significant:  $F(1, 45) = 1.47, p = .23$ . The within-subject effect (performance on the six subtests) was significant:  $F(5, 225) = 10.85, p < .0005$ , while the interaction between groups and within-subject effect was not,  $F(5, 225) = 1.77, p = .12$ .

To investigate the within-subject factor, t-tests for paired samples were completed on the subscales for the total sample. Significant differences were found between Popularity ( $M = 4.23, SD = 2.25$ ) and the other five subscales: Behavior ( $M = 6.19, SD = 1.96; t(46) = 5.76, p < .0005$ ), Intellectual and School Status ( $M = 5.98, SD = 1.94; t(46) = 5.90, p < .0005$ ), Physical Appearance and Attributes ( $M = 5.83, SD = 2.14; t(46) = 5.54, p < .0005$ ), Anxiety ( $M = 5.64, SD = 2.52; t(46) = 4.05, p < .0005$ ), and Happiness/Satisfaction ( $M = 6.19, SD = 2.19; t(46) = 6.14, p < .0005$ ). There was also a significant difference between Happiness/Satisfaction ( $M = 6.19, SD = 2.19$ ) and Anxiety ( $M = 5.64, SD = 2.52$ ),  $t(46) = -2.13, p = .04$ .

To compare the self-esteem scores of boys and girls, a between groups repeated measures ANOVA (2 X 6 factorial design) was computed on the six subscales of the Piers-Harris. A univariate diagnostic test revealed that the distribution of scores on the subscale Intellectual and

School Status lacked homogeneity of variance (Cochran's test = .75,  $p = .013$ ). In addition, the multivariate diagnostic indicator, Box's M test, indicated that the assumption of homogeneity of the variance-covariance matrices was not being met when the variables sex and scores on the six subscales were combined:  $F(21, 4122) = 1.70$ ,  $p = .02$ . It was necessary to continue analyzing the data using nonparametric means.

The Total Scores on the Piers-Harris of both boys and girls ( $N = 47$ ) were combined and ranked. The Wilcoxon-Mann-Whitney test revealed no significant difference between the two groups:  $U = 251.5$ ,  $p = .94$ . Previous analyses had already revealed that the scores for the whole sample on Popularity were lower than the scores on the other five subscales (Behavior, Intellectual and School Status, Physical Appearance and Attributions, Anxiety, and Happiness/Satisfaction). Scores on Happiness/Satisfaction also tended to be higher than scores on Anxiety.

Correlations among the Variables Age, Degree of Visual Impairment-LT, and Self-Esteem Measures for the Two Groups.

Table 18 presents the correlations for each group (MVI, MVI+) among the variables age, degree of visual impairment-LT, the Total Score and the subscales of the Piers-Harris. The variable age showed no significant relationship with the total score or the subscales of the Piers-Harris for each of

Table 18

Intercorrelations among the Variables Age, Degree of Visual Impairment-LT, the Total Score and the Subscales of the Piers-Harris for the Two Groups: MVI (n = 31) and MVI+ (n = 16)

Variables									
Variables	Age	DVI-LT	P.-H.	BEH	INT	PHY	ANX	POP	HAP
Age	<u>1.00</u>	.16	-.14	-.15	-.38	-.09	.15	-.22	-.06
DVI-LT	.07	<u>1.00</u>	-.35	-.42	-.24	-.03	-.35	-.31	-.26
P.-H.	-.07	-.38*	<u>1.00</u>	.77**	.83***	.60*	.72**	.72**	.86***
BEH	-.05	-.28	-.68***	<u>1.00</u>	.70**	.09	.74**	.31	.78***
INT	-.27	-.37*	.84***	.60***	<u>1.00</u>	.58*	.39	.53*	.68**
PHY	.06	-.34	.83***	.52**	.67***	<u>1.00</u>	.11	.54*	.36
ANX	-.05	-.21	.78***	.40*	.63***	.59***	<u>1.00</u>	.47	.82***
POP	.17	-.18	.78***	.40*	.56**	.65***	.53**	<u>1.00</u>	.46
HAP	-.04	-.42*	.78***	.50**	.59***	.86***	.64***	.53**	<u>1.00</u>

\*p<.05. \*\*p<.01. \*\*\*p<.001.

Note. DVI-LT: degree of visual impairment-LT; P.-H. = Piers-Harris; BEH = behavior; INT = intellectual and school status; PHY = physical appearance and attributes; ANX = anxiety; POP = popularity; HAP = happiness/satisfaction. Correlations for MVI+ group are above the diagonal; correlations for MVI group are below the diagonal.

the groups (MVI, MVI+). But degree of visual impairment-LT was significantly correlated with the Total Score as well as two subscales (Intellectual and School Status, Happiness and Satisfaction). For the group without other handicaps, as vision became poorer, the children described themselves as less smart, as doing less well in school, as well as feeling less content with themselves and their life. Nonsignificant correlations were obtained between degree of visual impairment-LT and the subscale Intellectual and School Status for the subset of children with MVI showing no academic delays ( $r [15] = -.25, p = .37$ ) and the subset showing delays ( $r [15] = -.47, p = .077$ ).

For the MVI group, intercorrelations among the subscales of the Piers-Harris were generally similar to the correlations obtained with the standardization sample for the measure with two exceptions: Happiness/Satisfaction and Intellectual and School Status (P.-H.,  $r (485) = .28$ ; MVI,  $r (31) = .59$ ;  $z = 2.01, p = .044$ ) and Happiness/Satisfaction and Physical Appearance and Attributes (P.-H.,  $r (485) = .53$ ; MVI+,  $r (31) = .86$ ;  $z = 3.62, p = .0004$ ). For the MVI+ group, five intercorrelations were found to be significantly higher than correlations obtained with the standardization sample: Anxiety and Behavior (P.-H.,  $r (485) = .24$ ; MVI+,  $r (16) = .74$ ;  $z = 2.51, p = .006$ ), Happiness/Satisfaction and Behavior (P.-H.,  $r (485) = .28$ ; MVI+,  $r (16) = .78$ ;  $z = 2.69, p = .0036$ ), Happiness/Satisfaction and Intellectual

and School Status (P.-H.,  $r$  (485) = .28; MVI+,  $r$  (16) = .68;  $z$  = 1.92,  $p$  = .027), Happiness/Satisfaction and Anxiety (P.-H.,  $r$  (485) = .58; MVI+,  $r$  (16) = .82;  $z$  = 1.76,  $p$  = .039), and Happiness/Satisfaction and Total Score (P.-H.,  $r$  (485) = .63; MVI+,  $r$  (16) = .86;  $z$  = 1.96,  $p$  = .025).

Regression Analyses. To investigate the contribution of a number of variables to self-esteem, four regression analyses were conducted. In addition to a regression analysis with the Total Score on the Piers-Harris, three regression analyses were performed with those subscales of the Piers-Harris that have demonstrated factorial consistency in other studies (Harter, 1990) as criteria variables: (1) Intellectual and School Status, (2) Physical Appearance and Attributes, and (3) Behavior. Because of the small sample size, it was necessary to economize on the number of predictor variables included in the analyses. Of the original six variables (age, sex, DQ, Screener, absence/presence of other handicaps, and degree of visual impairment-LT), it was decided to exclude two variables in three of the regression analyses: DQ and absence/presence of other handicaps. DQ was removed because it had a high correlation with the Screener ( $r$  (47) = .78,  $p$  < .0005) and the data for this variable were significantly skewed. The variable absence/presence of other handicaps (MVI, MVI+) was excluded in three of the regressions because of its non-significant correlation with the Total Score on the Piers-

Harris and the scores on the subscales. Despite low correlations, age and sex were included because these variables have been found to be significant in previous large scale studies on self-esteem.

The predictor variables for the first three regression analyses were age, sex, WIAT Screener, and degree of visual impairment-LT. The predictor variables for the fourth regression analysis (Behavior) included absence/presence of handicaps (MVI, MVI+), in addition to age, sex, degree of visual impairment-LT, and WIAT Screener, because of this variable's higher correlation with the dependent variable. The criterion variable for the first multiple regression was the Total Score on the Piers-Harris. For the second, the criterion variable was the subscale of the Piers-Harris identified as Intellectual and School Status. For the third, the criterion variable was the subscale Physical Appearance and Attributes. The criterion variable for the fourth was the subscale Behavior.

The first standard multiple regression was completed with the Total Score on the Piers-Harris of the total sample as the criterion variable. The predictor variables were age, sex, degree of visual impairment-LT, and the WIAT Screener. With the criterion of three standard deviations for Mahalanobis distance, no outliers were found among the participants. Since the same predictor variables were used for the first three regression analyses and only one other

variable was added for the fourth one, the correlation matrix for these variables is presented in one table (Table 19). Table 20 displays the results of the first standard multiple regression. Only two of the predictor variables contributed significantly to prediction of overall self-esteem, degree of visual impairment-LT (unique variance = .10) and academic performance as measured by the WIAT Screener (unique variance = .09). The four predictor variables in combination contributed another .03 in shared variability. In total, 22% (14% adjusted) of the variability in the scores on overall self-esteem could be predicted by information available from age, sex, degree of visual impairment-LT, and the WIAT Screener.

The second standard multiple regression was completed with scores on the subscale Intellectual and School Status of the Piers-Harris as the criterion variable. As in the first regression analysis, the predictor variables were age, sex, degree of visual impairment-LT, and scores on the WIAT Screener. Table 21 outlines the results of the second standard multiple regression. Only two of the predictor variables contributed significantly to prediction of scores on the subscale, degree of visual impairment-LT (unique variance = .08) and scores on the WIAT Screener (unique variance = .10). The four predictor variables together contributed another .11 in shared variability. In total, 29% (22% adjusted) of the variability in the scores on the



Table 19

Correlations among the Variables Age, Sex, Degree of Visual Impairment-LT, WIAT Screener, Total Score on the Piers-Harris, Absence/Presence of other Handicaps, the Subscales Behavior, Intellectual and School Status, and Physical Appearance and Attributes: N = 47

Variables	Variables						
	Age	Sex	DVI-LT	SCR	Hand.	P.-H.	BEH
Age	--						
Sex	.21	--					
DVI-LT	.09	.03	--				
SCR	-.14	.02	-.09	--			
Handicaps	-.10	-.02	.05	<b>.44**</b>	--		
P.-H.	-.11	-.01	<b>-.35*</b>	<b>.33*</b>	.18	--	
BEH	-.12	-.05	-.27	<b>.53***</b>	<b>.37*</b>	<b>.72***</b>	--
INT	<b>-.30*</b>	-.06	<b>-.34*</b>	<b>.38**</b>	-.01	<b>.81***</b>	<b>.57***</b>
PHY	.01	-.11	-.24	-.04	-.02	<b>.72***</b>	<b>.30*</b>
							<b>.63***</b>

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

Note. DVI-LT = degree of visual impairment-logarithmic transformation; SCR = WIAT Screener; Hand. = absence/presence of other handicaps, MVI = 1, MVI+ = 0; P.-H. = Piers-Harris; BEH = behavior; INT = intellectual and school status; PHY = physical appearance and attributes.

Table 20

Summary of the Standard Multiple Regression for Variables  
Predicting Total Scores of the Piers-Harris, N = 47

<u>R</u>	<u>R</u> <sup>2</sup>	<u>F</u>	Pred. Var.	<u>b</u>	<u>SEb</u>	<u>Sr</u> <sup>2</sup>	<u>F</u>
.47	.22	2.92*	Age	-.19	.63	.00	-.30
		(4,42)	DVI-LT	-10.07	4.27	.10	-2.36*
			Sex	.02	1.48	.00	.01
			SCR	.15	.07	.09	2.14*

\*p<.05.

Note. R = Multiple R. R<sup>2</sup> = Multiple R Squared. Pred. Var. = Predictor Variables. b = Unstandardized Regression Coefficient. SEb = Standard Error of the Regression Coefficient. Sr<sup>2</sup> = Unique Variance.  
 DVI-LT = degree of visual impairment-logarithmic transformation; SCR = WIAT Screener.

Table 21

Summary of the Standard Multiple Regression for Variables  
Predicting Scores for the Subscale Intellectual and School  
Status, N = 47

<u>R</u>	<u>R<sup>2</sup></u>	<u>F</u>	<u>Pred.</u> <u>Var.</u>	<u>b</u>	<u>SEb</u>	<u>Sr<sup>2</sup></u>	<u>F</u>
.54	.29	4.30**	Age	-.19	.11	.05	-1.69
		(4,42)	DVI-LT	-1.69	.77	.08	-2.21*
			Sex	-.03	.27	.00	-.09
			SCR	.03	.01	.10	2.47*

\*p<.05.    \*\*p<.01.

Note. DVI-LT = degree of visual impairment-logarithmic transformation; SCR = WIAT Screener.

subscale Intellectual and School Status could be predicted from information available through age, sex, degree of visual impairment-LT, and the WIAT Screener.

The criterion variable for the third standard multiple regression was the subscale Physical Appearance and Attributes. Table 22 outlines the results of the third standard multiple regression. Age, sex, WIAT Screener, and degree of visual impairment-LT did not predict the child's perception of his/her physical appearance and attributes.

The criterion variable for the fourth standard multiple regression was the subscale Behavior of the Piers-Harris. The predictor variables were age, sex, absence/presence of other handicaps, the degree of visual impairment-LT, and scores on the WIAT Screener. Table 23 outlines the results of the fourth standard multiple regression. Only one of the predictor variables contributed significantly to prediction of the scores on the subscale: WIAT Screener (unique variance = .14). The five predictor variables together contributed another .23 in shared variability. In total, 37% (29% adjusted) of the variability in the scores on the subscale Behavior could be predicted from information available through age, sex, absence/presence of other handicaps, degree of visual impairment-LT, and overall academic performance.

### Summary

The results of tests on the data for self-esteem only

Table 22

Summary of the Standard Multiple Regression for Variables  
Predicting Scores for the Subscale Physical Appearance and  
Attributes, N = 47

<u>R</u>	<u>R<sup>2</sup></u>	<u>F</u>	<u>Pred.</u> <u>Var.</u>	<u>b</u>	<u>SEb</u>	<u>Sr<sup>2</sup></u>	<u>F</u>
.27	.07	.85	Age	.04	.14	.00	.30
		(4,42)	DVI-LT	-1.61	.96	.06	-1.67
			Sex	-.24	.33	.01	-.71
			SCR	-.01	.02	.00	-.36

Note. DVI-LT = degree of visual impairment-logarithmic transformation; SCR = WIAT Screener.

Table 23

Summary of the Standard Multiple Regression for Variables  
Predicting Scores for the Subscale Behavior, N = 47

<u>R</u>	<u>R<sup>2</sup></u>	<u>F</u>	<u>Pred.</u>	<u>b</u>	<u>SEb</u>	<u>Sr<sup>2</sup></u>	<u>F</u>
			Var.				
.61	.37	4.76**	Age	-.01	.11	.00	-.10
		(5,41)	Hand	.79	.57	.03	1.38
			SEX	-.19	.51	.00	-.38
			SCR	.04	.01	.14	3.02**
			DVI-LT	-1.44	.74	.06	-1.93

\*\*<.01.

Note. Hand = absence/presence of other handicaps, MVI = 1, MVI+ = 0; SCR = WIAT Screener; DVI-LT = degree of visual impairment-logarithmic transformation.

partially confirmed Hypothesis III. There was no significant difference in reported self-esteem between the two groups, with results being in the average to slightly above average range. Children with MVI **without** and **with** other handicaps reported that their popularity with other children was at a lower level than other perceived areas of functioning, but their popularity level was still within the average range in terms of the standardization sample. For the whole group, age and sex was found to have no significant influence on self-esteem, contrary to previous large scale studies of children with no handicaps. Degree of visual impairment-LT and academic performance were significant predictors of overall self-esteem and perceptions of intellectual and academic abilities. On the other hand, degree of visual impairment-LT and the other predictors (age, sex, and results on the Screener) did not significantly predict the child's perception of his/her physical characteristics. Academic performance was found to be the only significant predictor of the child's evaluation of his/her behaviour.

#### Hypothesis IV

Through the Personal Interests and Concerns interview, an attempt was made to obtain indications of the child's subjective experience of having a moderate visual impairment. It was considered significant if the child spontaneously mentioned the visual impairment during the

interview and in what context he/she did so.

Previous studies using both quantitative measures and methods of collecting data through open-ended questions have often found that results are enhanced and supplemented by the different approaches. But "the findings may not interlock neatly" (Krahn, Hohn, & Kime, 1995, p. 208) and some results may actually contradict others. There are a number of reasons for this state of affairs, one of them being the difference in question format. Krahn, Hohn, and Kime (1995) proposed that the different question format may encourage the respondent to focus on different perceptions and memories, therefore eliciting responses that are not easily combined. During the present study, the information obtained through the open-ended questions was not used to confirm information found with the Piers-Harris but, instead, was used to obtain a more in-depth perspective on the experience of being visually impaired.

In addition to the data from the 47 participants analyzed in the previous sections, the data from three more children/adolescents were included: information from the previously excluded sibling, and information from two children who required their mother to act as interpreter because of speech difficulties. The information obtained from 50 children (MVI = 32; MVI+ = 18) was grouped into similar categories and percentages were tabulated for each question. It should be noted that when participants gave



several answers only the first one was counted.

The first questions asked were: "What do you like? What makes you happy?" The greatest number of responses (16/50, 32%) focused on relationships with others, particularly friends (9/16). The next most often cited were activities that required active participation: free play (11/50, 22%; i.e., riding a bicycle, using playground equipment, drawing/building things, playing with siblings or pets, drama) as well as sports (9/50, 18%) such as swimming, hockey, or basketball. A smaller number of children (9/50, 18%) preferred more passive activities (i.e., reading, listening to music, watching television, eating). Three of the participants (6%) stated that having no school made them happy. Another two (4%) focused on different aspects of life: one said success was important and the other stated she wanted to be left alone.

The second set of questions was: "What do you dislike? What makes you sad?". A number of responses (17/50, 34%) focused on the impact of conflicts with friends and family (i.e., being bugged, feeling left out or ignored, having to live away from parents, expectations of parents, conflicts with friends). Another category of answers reported (10/50, 20%) was being teased, picked on, or talked about. Some of the children expressed also being saddened by the death of a relative (6/50, 12%) and when people and animals were hurt (5/50, 10%). While a number complained about school work

and house chores (5/50, 10%) or about being bored or the hot weather (3/50, 6%), others expressed a concern for world issues (2/50, 4%) such as abortion and hunger. Another four (8%) responded to the question with "nothing".

The next question was presented in the following way: "If you were given one wish, anything you wanted, what would you ask for?" Eighteen of the participants (36%) indicated that they would ask for things: money, stereo, CD's, bike or car, own room, own house, pets, driver's license, toys. Another large segment of the group (12/50, 24%) asked for changes that were more personal or interpersonal: to remain a teenager ("It's just fun"), to have more knowledge about the universe, to change one's appearance, to have a girlfriend ("You have to remember I am only 15 and I have never had one"), to be a "friend of Jehovah", to return to an old neighbourhood, to become a rock star, to meet a favourite actor. One stated, tongue-in-cheek, that he wanted to be rid of his sister while another indicated that the world would be more peaceful without rock-and-roll. For five individuals (10%), the wish involved vision becoming normal for themselves or for a good friend ("she is special, she has helped me a lot"). An additional five (10%) expressed that they would like other limitations to be removed: three focused on motor limitations, one wanted the sense of smell to return ("fresh bread, flowers, food"; this child had experienced a brain tumour), and another with albinism

wanted to be able to tan like others. Four individuals (8%) focused on world peace and improvements in the environment. While a couple of individuals would not state a wish, three (6%) stated they would choose no school and one asked for no more teasing.

The last question dealt with whether they felt different (If yes, why?) and/or special (If yes, why?). In this group, 50% of the participants indicated that they did not feel different, while 44% (22/50) said they always felt different and another three (6%) sometimes felt different. From the group of 22 who stated that they felt different, nine individuals stated either that everyone was different or unique or they identified some quality about themselves that made them different (had a good memory, looked physically different, were more expressive than others, sounded different). Another nine (18%) reported that they were different because they had a visual impairment, some of whom (4) indicated it made them the brunt of teasing. One stated being different because of shyness, and another because of height. Two children (4%) reported being different because they were left out.

When asked if they felt special, 35 of the 50 children (70%) responded with "Yes". Nine (18%) said "No" while four reported "sometimes" and another two said they did not know. Of the group who stated they felt special, eight (16%) indicated that everyone was special, and seven (14%)

did not know why they felt special. A variety of reasons were given for feeling special: two indicated that they had special things and special friends (other visually impaired persons) because they were visually impaired. Two indicated that although they were visually impaired, they could do many things and one in particular reported that he was a good hockey player despite his handicap. Others expressed feeling special because of being accepted by friends despite motor impairment, or appearance (a visibly noticeable disability), or having had different experiences than others. A number related their feeling special to having good relationships with friends and family (5/50, 10%). While a few linked their sense of specialness to having material things (i.e., pets, being given money), more participants related it to personal characteristics: "like myself", "always happy, almost always happy", being able to do something special (imitate sounds well), or having the conviction that one would accomplish great things some day (would show those who had rejected and teased). Three individuals indicated that they did not feel special and elaborated further: "Could be special because of my eyesight but I fit in"; "Most people get teased about their glasses but people say: I like your glasses"; and "Not really. Not really different from any of my friends" (described the characteristic in each friend that made them different, revealing the basis for her sense of belonging).

Looking at the questionnaire as a whole, 20 of the 50 participants (40%; eight girls and 12 boys; 11 children between the ages of 9 and 12, and nine children between the ages of 13 and 16) mentioned the visual impairment in a variety of contexts. This occurred mostly in response to the questions focusing on feeling different or special but also when asked about a wish or when they talked about the experience of being teased or rejected. For a significant number of these children then, the experience of being moderately visually impaired was perceived as having an impact on how they perceived themselves and their life.

#### Summary of the Results

The first goal of the study was to confirm that children with moderate visual impairment without other handicaps performed at levels similar to children with normal vision on a measure of intellectual functioning. The first hypothesis also predicted that the intellectual functioning of the group of children with moderate visual impairment with other handicaps would be significantly lower than with the other MVI group. The hypothesis was confirmed: the mean Developmental Quotient for the MVI group was in the average range while the mean Developmental Quotient for the MVI+ group was in the borderline range of intellectual functioning.

The second hypothesis predicted that the academic functioning of the two groups of children would be

significantly lower than the normative sample for the WIAT. This hypothesis was also confirmed: the MVI group performed significantly less well than the standardization sample of the academic measure used. In addition, 48% of the participants showed significant and important discrepancies between the level of performance that was expected in terms of their intellectual ability and their actual level of performance. The MVI+ group's mean performance level was significantly lower than the results obtained with the standardization sample but was consistent with results obtained on the measure of intellectual ability.

The third hypothesis addressed the issue of self-esteem. It was predicted that the level of self-esteem of children with moderate visual impairment would be influenced by the following variables: age, sex, level of intellectual functioning, academic achievement, absence/presence of other handicaps, and visual acuity. This hypothesis was only partially confirmed. Contrary to previous large scale studies in the population with normal vision, age and sex did not predict overall self-esteem or scores on the three subscales Behavior, Intellectual and School Status, and Physical Appearance and Attributes. Intellectual functioning was found to be highly correlated with the WIAT Screener and was therefore not used in the regression analyses. Academic achievement and visual acuity were found to be significant predictors for the Total Score of the

Piers-Harris and for the subscale Intellectual and School Status. Academic performance was the only significant predictor for the subscale Behavior and no variable predicted scores on Physical Appearance and Attributes.

The fourth hypothesis predicted that a large number of children and adolescents would mention some aspect of the experience of being visually impaired in the course of the small interview focusing on their interests and concerns. This hypothesis was also confirmed: 40% of the participants mentioned their visual impairment in a variety of contexts, some when they talked about their experience of being teased, others when describing their feeling of being different and/or special, and still others when they vocalized the wish that vision would improve in themselves or others. At the same time, the children and adolescents expressed a wide range of interests and concerns, many of which are also expressed by children with normal vision.

## CHAPTER IV

### DISCUSSION

The results of the present study confirmed Hypothesis I. That is, children with a moderate degree of visual impairment without additional handicaps demonstrated average overall intellectual ability. Consistent with Hypothesis II, a significant number of children with moderate visual impairment without other handicaps were found to function academically at a statistically and clinically lower level than would be expected from their level of cognitive ability. As expected from Hypotheses I and II, children who presented with one or several other handicaps in addition to the visual impairment were found to have a lower performance on both intellectual and academic measures than those found with the standardization sample of the tests administered. Hypothesis III was only partially confirmed. Overall academic performance and degree of visual impairment were the only variables that significantly predicted overall self-esteem, while age, sex, and absence/presence of other handicaps did not. As a group, the children with moderate visual impairment (without and with other handicaps) reported feeling good about themselves. However, although still within one standard deviation from the mean, the children in the present study reported a level of perceived



peer acceptance that was significantly lower than levels of perceived competence in other areas.

These findings are addressed below in the context of the prevalence rate for moderate visual impairment. Then, a discussion of the findings in the areas of intellectual and academic functioning and in self-esteem are presented separately. This is followed by a discussion of limitations of the present study and some possible directions for future research.

Because information was centralized in Halifax for the three Maritime Provinces, information on the prevalence rate for moderate visual impairment compared to the prevalence rate for more severe degrees of visual impairment was available. In the course of the study, it was found that, for that specific geographical area, about 40% of the total population with a visual impairment or blindness were moderately visually impaired. From data collected by the American Foundation for the Blind, Kirchner (1988) had estimated that at least 50% of the population with visual impairment had a moderate degree of visual loss. She felt that there was extensive lack of reporting for this category and had speculated that there could be even five times more children with moderate than with more severe degrees of visual impairment.

The numbers counted during the present study were of children who had been registered with the APSEA - Resource

Centre for the Visually Impaired. This registration, usually recommended by an eye specialist or a consultant/teacher for the visually impaired, allowed the children to benefit from extra help in school and/or to obtain necessary technological equipment for use in the classroom. While most parents welcomed this extra assistance, there may have been a number of parents who decided not to have their child identified as having special needs within the school system. These parents may have felt that the moderate degree of visual impairment was not debilitating enough to warrant such an identification for fear that it might prove stigmatizing for their child.

Recognizing that some under-reporting may have occurred, it is suggested from the available information that moderate visual impairment probably occurs about as often but not more frequently than more severe forms of visual impairment and that, for the Maritime Provinces, Kirchner's initial estimate proved generally correct. Thus, since a large proportion of children with blindness and visual impairment function visually in the moderate range as reflected by information obtained in the Maritime Provinces, the identification of their specific intellectual, academic, and self-esteem status is especially important. In addition, this status likely differs depending on whether or not the child has additional handicaps. The specific goal of the present study was to clarify the relationship between

the degree of visual impairment and the performance on academic achievement and self-esteem measures in this population.

In the present study, 5 (16%) of the 31 children with moderate visual impairment without other handicaps and 4 (25%) of the 16 children with moderate visual impairment with other handicaps were attending or had attended a residential school for the blind and the visually impaired for a period of 6 months or more. These children were included in the study to ensure greater representation of the total population of children with moderate visual impairment. Because of the small number of children having attended a residential school, no comparison was attempted with children having never attended such specialized settings.

Intellectual Functioning. The intellectual functioning of the two groups of children who presented with moderate visual impairment were found to be significantly different. The group without other handicaps demonstrated performance in the average range, while the group with other handicaps had a mean performance in the borderline range of cognitive ability.

As found in previous studies with earlier versions of the Wechsler Scales (Daugherty & Moran, 1982; Groenveld & Jan, 1992; Talbot, 1992), overall intellectual ability of the group without other handicaps was in the average range

with a standard deviation for the overall DQ similar to the standard deviation of the Full Scale IQ reported for the standardization sample of the WISC-III. Performance on the five subtests of the WISC-III administered was within one standard deviation from the standardization sample mean for that measure.

In terms of the five subtests of the WISC-III for the group without other handicaps, there were similar mean scores on Information, Vocabulary, and Picture Completion, but significantly higher performance on the subtest Block Design. Although still within one standard deviation from the standardization mean, the mean for Block Design ( $\bar{M} = 11.42$ ) was above the mean of the standardization sample ( $\bar{M} = 10.00$ ). Groenveld and Jan (1992) and Talbot (1992) had obtained similar results. In the study by Groenveld and Jan, children with moderate and severe visual impairment had obtained mean scale scores on Block Design that were similar to each other (moderate,  $\bar{M} = 10.7$ ; severe  $\bar{M} = 10.9$ ). Groenveld and Jan proposed that, when complete visual information is available within the span or field of vision to children who have low vision, they are able to "analyze it and reconstruct spatial relationships" (p. 69). In addition, it is also possible that the stimuli that comprise the Block Design subtest have characteristics that allow easier perception of the visual details. That is, the pictures of the block designs offer good contrast in the use

of red and white colours with clear borders. Such good contrast could explain the marked difference in performance between Block Design and the other visual subtest, Picture Completion, in which more shading is used as the pictures get more complicated. On the other hand, this does not explain the better performance on Block Design than on Information and Vocabulary. It may be that the emphasis placed by parents, teachers, itinerant/resource teachers for the visually impaired on the efficient use of remaining vision may have contributed to the better performance on this subtest that relies on immediate visual perception but relies less on prior visual experience.

For the group without other handicaps, the degree of visual loss was related to the performance on one subtest: Picture Completion. As visual acuity decreased, performance on this subtest also became poorer. Greater visual loss would appear to be linked to an individual's decreased ability to identify smaller details and to differentiate significant from non-significant details. The significant correlation between Picture Completion and degree of visual impairment does suggest that reduced visual acuity significantly affects the skills needed to accomplish this task (visual discrimination, visual alertness, long-term visual memory; Sattler, 1992) and results on this subtest for children with visual impairment cannot be interpreted as equivalent to results obtained by children with normal

vision. In addition, the use of this subtest to form a composite of the intellectual ability of a child who is visually impaired may be questionable, particularly for those children who present with more limited visual acuities.

Consistent with the results obtained by Hull and Mason (1995), the immediate recall of strings of digits was found to be at the mean and did not reveal greater than average skills in the auditory domain. From these results, it could be deduced that greater simple memory capabilities observed in children with more severe visual impairment (Dekker & Koole, 1992) or blindness (Hull & Mason, 1995; Warren, 1994) does not develop until vision is severely restricted. Further analyses revealed a more complex relationship. The children in the group without other handicaps were found to be diverse. One subset, presenting with academic delays, scored below average on Digit Span, while the other subset, presenting with no academic delays, obtained above average scores on this measure of immediate memory function. In addition, for the group presenting with no academic delays, performance on the subtest was better in children with greater visual impairment. Therefore, simple memory capabilities would appear to be more developed with greater visual impairment in some but not all children identified as having moderate visual impairment.

Results obtained on these tasks have some relevance to

the issue of the role of vision in the integration of multi-sensory input. The two theories of importance for the present findings are the visual organization theory (Warren, 1974) and the sensory compensation theory (Millar, 1994; Talbot, 1992). The visual organization theory advocates that the sense of vision acts as a frame of reference for incorporating information available from other senses. The sensory compensation theory contends that when vision is reduced or absent, the other senses become more highly developed. An interpretation of the significantly higher performance on Block Design compared to other subtests (Information, Vocabulary, and Picture Completion) is that it may reflect the primacy of the visual system. This primacy would appear to be expressed when the stimuli have qualities that are less vulnerable to decreased visual acuity (i.e., minimal use of shading, clear boundaries, limited reliance on prior visual experience). Therefore, results on Block Design could be interpreted as offering support for Warren's visual organization theory (1974).

On the other hand, results on the Digit Span subtest revealed a rather complex relationship. Overall results were at the mean and did not support either the visual organization theory (Warren, 1974) or the sensory compensation theory (Millar, 1994; Talbot, 1992). Further analysis revealed the existence of two subsets within the group of children with moderate visual impairment without

other handicaps. For those children showing no academic delays, better auditory memory skills (Digit Span) occurred in conjunction with more extensive visual impairment. This relationship can be interpreted as consistent with the theory of sensory compensation. For the subset of children with delays, poorer auditory memory skills did not demonstrate a similar relationship with degree of visual impairment. With different children, under specific circumstances, and/or with particular tasks, both theories would appear to hold some weight. These results bring to light the existence of subsets of children with moderate visual impairment without other handicaps with very different patterns of strengths and weaknesses that may be obscured by studying them as a group.

For the group with moderate visual impairment with other handicaps, mean performance on the overall developmental quotient and on the five subtests of the WISC-III was between one and two standard deviations below the mean for the standardization sample of the WISC-III, reflecting performance levels in the borderline range of intelligence. There was greater variability within the MVI+ group, as reflected in a larger standard deviation for the DQ, than within the group without other handicaps. The greater standard deviation would appear to reflect the wider range of overall ability of the children who were included in the MVI+ group. While all the children in this group had



been diagnosed with at least one other condition in addition to the visual impairment, there was great variability in the severity of the co-morbid condition (e.g., mild sensory neuropathy vs. marked motor incoordination).

Contrary to the group without other handicaps, performance across the five subtests was consistent for the group with other handicaps. In addition, the correlation between the degree of visual impairment and scores on the DQ and three of the subtests (Vocabulary, Digit Span, and Block Design) was significant for the MVI+ group. In each instance, greater visual limitations occurred in conjunction with significantly poor performance on these measures. It would appear that, in the presence of other handicaps in addition to the visual impairment, the degree of visual loss may be a reflection of the severity and the pervasiveness of the combination of co-morbid conditions (e.g., cerebral palsy and visual impairment, hormonal imbalance and visual impairment).

Academic functioning. While results on the WIAT Screener for the group without other handicaps were within one standard deviation from the mean for the standardization sample of this test, there was a significant difference between overall ability level and overall academic performance, confirming results obtained by Daugherty and Moran (1982) on the WRAT and the Monroe-Sherman Test. The close links between the WISC-III and the WIAT allowed a more

in-depth look at the difference between expected (as determined from the DQ scores) and obtained scores. With such a comparison, it was possible to determine that 48% of the children with moderate visual impairment without other handicaps showed significant delays on one or more of the academic subtests. Contrary to results obtained by Daugherty and Moran (1982) who had observed delays in mathematics and reading comprehension, the present study did not find one academic area more affected than the others, as there were no significant differences obtained between mean scores on the subtests. Similar to the findings of Daugherty and Moran (1982), the relationship between distance visual acuity and the various academic tasks was not significant for the MVI group.

In addition, within the group without other handicaps, scores on the subtest Digit Span of the WISC-III and Word Attack of the WRMT-R were found to be lower for a subset of children who did present with delays than for a subset of children with no academic delays. Difficulties with short term memory, as measured through the Digit Span subtest, have been reported in children presenting with specific language symbol disorders (Kamhi & Catts, 1989; Strang & Casey, 1994) as well as in children with learning disabilities or Attention Deficit Hyperactivity Disorder (Kaufman, 1994). Phonological processing difficulties, as revealed on the Word Attack subtest, have also been found in

children with reading disabilities (Siegel, Share, & Geva, 1995) and arithmetic difficulties using a variety of measures in addition to Word Attack (Kamhi & Catts, 1989).

Children who presented with academic delays were from families with lower socio-economic status than children who presented with no delays. Similar results with the general population have been obtained by other researchers, including Miner (1968), Morrison and Hinshaw (1988), and O'Connor and Spreen (1988).

For the group with other handicaps, there was no significant difference between overall ability level (borderline range) and overall academic performance. As with the results on the WISC-III, there was greater variability in the range of scores obtained within the MVI+ group compared to the group without other handicaps as reflected in larger standard deviations for both the overall academic score (Screeners) and for the subtests. However, correlations among subtests were generally high in the MVI+ group, revealing consistency in performance between tasks within each individual. A significant correlation was found between distance visual acuity readings and Word Attack. As with the WISC-III, greater visual impairment would appear to reflect the pervasiveness of the combination of handicaps with visual impairment for this group.

Results also revealed a difference in the pattern of responding between boys and girls. While the difference in

overall performance between the two groups was not significant, there was a difference in the results on the subtests for each group. The performance of the girls was found to be consistent across the five tasks. For the overall group of boys, performance on Mathematics Reasoning was found to be better than performance on other academic subtests. When the group was subdivided by absence/presence of other handicaps in addition to the visual impairment, the boys presented with different response patterns. For the boys without other handicaps, Mathematics Reasoning was better than Spelling and Word Attack. For the boys with other handicaps, Mathematics Reasoning was better than Reading Comprehension.

Self-esteem. Consistent with results obtained by Schindele (1974) and Loeb and Sarigiani (1986), children without other handicaps reported feeling good about themselves overall, with results within one standard deviation from the mean for the standardization sample of the Piers-Harris. Scores in this range are descriptively labelled as "slightly above average" (Piers, 1984). Children with other handicaps also reported feeling good about themselves, with results also within one standard deviation from the mean of the standardization sample. These scores are descriptively labelled "average" (Piers, 1984). At the same time, children in both groups reported levels of perceived peer acceptance at significantly lower

levels than other areas of perceived competence.

Extrapolating from the information offered by Piers (1984) concerning the Total Scores, these levels of perceived peer acceptance can be described as ranging from "slightly below average" to "below average".

No significant difference was found between the level of self-esteem of boys or girls. There was also no difference in self-esteem by age. It should be noted that Varni, Rubenfeld, Talbot, and Setoguchi (1989) did not obtain differences in self-esteem by age or sex in their study of children with congenital/acquired limb deficiencies. The lack of difference by sex or age is consistent with results obtained by Meighan (1971) who used a different measure, the Tennessee Self-Concept Scale. Because of Meighan's results, Warren (1994) had expressed concerns about the validity of using the Tennessee Self-Concept Scale with the population with visual impairment. In view of the lack of differences in self-esteem in terms of age and sex obtained in the present study, it may be necessary to extend the same caution to the use of the Piers-Harris with this population. However, such a conclusion may be premature. There may have been no differences found in the Meighan study and in the present study because of the limited number of participants. Conversely, the studies that have found differences in self-esteem by age (McCarthy & Hoge, 1982; O'Malley & Bachman,

1983; Simmons & Blyth, 1987) and sex (Simmons & Blyth, 1987) have involved large samples. For example, McCarthy and Hoge (1982) had 546 participants while O'Malley and Bachman (1983) had between 113 and 154 participants in each of their seven groups. Minor increases in test scores resulted in statistical significance. It may also be that the presence of a visual impairment mitigates the influence of age and sex on self-esteem by shifting the focus of attention of the child and significant others to the visual impairment.

On the other hand, the data obtained with both the Piers-Harris and the Tennessee may actually reflect the children's perception of themselves. Having a visual impairment may not automatically mean that a child experiences low self-esteem. Looking at children with severe asthma, Harter (1986) suggested that the children with good self-esteem demonstrated an adaptation to their reality and set standards for themselves to accommodate that reality. A similar process may be operating with children with visual impairment, particularly when positive parental support is part of the child's experience. Research with adolescents (Felson & Zielinski, 1989) and with children with congenital/acquired limb deficiencies (Varni, Rubenfeld, Talbot, & Setoguchi, 1989) has emphasized the importance of the relationship with parents and the perceived support they offer in the development of positive self-esteem.

Studies that have looked at the overall self-esteem of children with various other handicaps using a variety of measures have generally found similar results. Children with oral-facial clefts (Starr, 1978), children with congenital/acquired limb deficiencies (Varni et al., 1989), and children with a variety of physical disabilities (King et al., 1993) have not reported low self-esteem. Similarly, Short (1992) did not find a difference in self-esteem between children who were achieving normally, children with learning disability, and children who were developmentally delayed. However, Chiu (1990) did find that the self-esteem of children with average ability or identified as gifted were significantly higher than the self-esteem of children identified as mildly mentally handicapped.

Self-esteem has been studied more extensively in the population with learning disabilities but results have been inconsistent. While some studies (Bear, Clever, & Proctor, 1991; Cooley & Ayres, 1988; La Greca & Stone, 1990) have found lower overall self-esteem in children with learning disabilities compared to children achieving at average levels, other studies have not found such differences (Clever, Bear, & Juvonen, 1992; Montgomery, 1994; Sabornie, 1994; Short, 1992). A number of studies have found lower self-esteem in children with learning disabilities in the subdomains of perceived educational and behavioral competence (Clever, Bear, & Juvonen, 1992; Bear, Clever, &

Proctor, 1991; Cooley & Ayres, 1988; Montgomery, 1994; Renick & Harter, 1989) or perceived social acceptance (La Greca & Stone, 1990). Sex differences in terms of self-esteem have been found in some studies, with higher self-esteem reported by boys (Bear, Clever, & Proctor, 1991; Clever, Bear, & Juvonen, 1992), while others have not found such differences (La Greca & Stone, 1990).

Crocker and Major (1989) looked at research focusing on global self-esteem and found that other "stigmatized" groups in addition to those with physical handicaps (i.e., blacks, homosexuals, women, the mentally ill) do not necessarily report having low self-esteem. Crocker and Major proposed three ways through which belonging to a stigmatized group may offer a protection for the individual's self-concept: 1) negative feedback given to the person could be attributed to the characteristics that has made one a member of the stigmatized group and therefore taken less personally; 2) members of stigmatized groups would appear to compare themselves (favourably) to other members of the stigmatized group rather than compare themselves (unfavourably) to the larger group; and 3) members value those aspects or dimensions where group members tend to perform well and devalue those dimensions where the stigmatized group members tend to perform less well. Extending this interpretation to the present study, negative feedback received by children with moderate visual impairment may be attributed by them to



the visual impairment. More favourable comparisons may be made between the self and others who are more severely visually impaired or blind, resulting in generally positive self-esteem.

Findings in the present study pertaining to degree of visual impairment and self-esteem can be interpreted as supporting the ideas offered by Crocker and Major. Specifically, overall self-esteem and perception of intellectual and school status were found to be higher in children with better visual acuity than in children who presented with more extensive visual impairment. The other area that was found to be predictive of overall self-esteem and of the child's perception of intellectual and school status was overall academic performance. Children who performed better on academic measures reported higher levels of self-esteem than children who performed less well. Other studies have also found a relationship between academic performance and self-esteem (Battle, 1993; Bear, Clever, & Proctor, 1991; La Greca & Stone, 1990). Together academic achievement and degree of visual impairment were found to account for a significant proportion (approx. 20%) of the variability in self-esteem reported by children with moderate visual impairment.

The children's responses to the semi-structured interview did not include responses that could be perceived as totally at odds with their responses to the Piers-Harris.

It is not to say that a number of them were not struggling with the repercussions of having a handicap. While 40% did bring up the topic of visual impairment, it is noteworthy that they did so in the context of a study on visual impairment and that the children were informed about the goals of the study at the outset. While a number appeared to be struggling with the consequences and the ramifications of the impairment, just as many appeared to accept it and some even verbalized their acceptance. Most of the children seemed to be more concerned with general age-appropriate issues.

#### Limitations of the present study

Because visual impairment is a low incidence handicap, many studies with this population are limited in sample size. For example, the Daugherty and Moran study (1982) included only 11 children with moderate visual impairment while the Groenveld and Jan archival study (1992) included only 34 children with MVI. The present study has the same limitation. There are many factors (i.e., specific eye conditions, age, age at diagnosis, SES, range of ability) on which these children differ and which should be taken into consideration when attempting to clarify the impact of the degree of visual impairment. The limited number of participants did not permit an evaluation of the interaction of these variables, particularly in the sample of children who present with other handicaps in addition to the visual

impairment.

A greater number of children from the Maritime Provinces participated compared to children in the Province of Ontario, despite the fact that Ontario has one of the largest provincial populations in Canada. A number of reasons could have led to this differential rate of responding. Specifically, greater access to all records for recruitment was made available in the Maritime Provinces due to the centralized role the APSEA - Resource Centre for the Visually Impaired plays in delivery of services and to the researcher's previous work experience there. In Ontario, recruitment difficulties were linked to the inconsistent level of delivery of services from one School Board to the next for children with moderate visual impairment and to the need to forward information about the study through third parties less informed about the study and its goals. Despite these limitations, sufficient numbers of parents and their children were willing to participate, allowing the exploration of important variables and the accumulation of significant preliminary information.

To obtain information on prior visual experience, data on the child's age at diagnosis was obtained from the parents. It became clear that the issue of previous and present visual functioning raised by Warren (1974) was not a simple one. The diagnosis of a visual impairment had generally been given before the age of one for the group

without other handicaps and between the ages of 2 and 3 for the group with other handicaps. In addition, children with more extensive visual impairment in both groups were identified earlier than children with less extensive visual impairment. For four children in the MVI+ group, vision problems were either an initial or a later symptom of intracranial tumour(s). For these children, age at diagnosis did not reveal at which point vision had started to be affected or had significantly deteriorated. To clarify further the issue of prior visual acuity, the questionnaire completed by the parents should have also included questions pertaining to the time span during which they had suspected the presence of visual difficulties in their child.

As the data were accumulated and analyzed, some restrictions applicable to the specific population came to light. The calculation of overall intellectual functioning was determined from scores on two subtests from the Verbal area and two subtests from the Performance area, a short form recommended by Sattler (1992). One of the Performance subtests (Picture Completion) was significantly correlated with the degree of visual impairment and the obtained DQ can be considered a reflection of the interaction of both intellectual ability and degree of visual impairment, particularly for children with more extensive visual impairment. This interaction is problematic in view of the

fact that delays in academic functioning were determined from discrepancy scores between expected (tabulated from DQ) and obtained scores and may have influenced the identification of a number of children as delayed or not delayed in academic functioning.

In the area of self-esteem, the use of the Piers-Harris allowed children with even limited ability to respond to the simple sentence stems and answer format (yes/no). One significant limitation of the Piers-Harris is the summation of the individual answers to obtain the Total Score. Because of item summation, the calculation of the overall self-esteem score is not independent from scores on the various subscales. Moreover, during the present study, children and adolescents reported reduced peer acceptance. However, it is important to note that factor studies with the Piers-Harris (Harter, 1990) have obtained inconsistent results with the Popularity subscale. The results obtained in the present study would need to be confirmed using a measure that has demonstrated a consistent factor structure.

#### Future Directions for Research

Further studies will need to focus particularly on including sufficient numbers of participants so that age, sex, eye conditions, degree of visual impairment, and SES can be adequately represented. The only way to achieve such representation is to establish close links between researchers in this area and parents (through parent

organizations) and agencies (school boards, specialized schools, CNIB) working with school age children who present with moderate visual impairment. Efforts should concentrate initially on identifying potential subjects, offering information about the studies and about the significance of the data to be accumulated.

It will be important in future research to administer all subscales of the Wechsler Intellectual Scale for Children - III to obtain correlational data with degree of visual impairment to determine if any of the other subtests, in addition to Picture Completion, are significantly related to visual acuity.

Visual acuity recordings should include measures of near vision as well as distance vision. Although the correlation between near and far acuity readings is high (Coren, 1987), differences between the two may account for some of the observed variability in performance on academic measures that a number of the children demonstrated.

The academic performance of the group with moderate visual impairment without other handicaps in the present study was found to be significantly lower than expected from ability scores. It would be necessary to determine if such findings would still be found with a larger, more representative sample.

In the presence of primary sensory deficits, the diagnosis of learning disorders can be made if the learning

delays are "in excess of those usually associated with the deficit" (American Psychiatric Association, 1994, p. 46-47). At the present time, there are no available norms for the population with visual impairment and it is vitally important that such norms be compiled.

It will also be important to investigate those variables that have been found to differentiate between children who have been diagnosed with learning difficulties and children who are achieving normally. These same variables may also be significant in distinguishing the subset of children without other handicaps who present with academic delays from those who do not. In addition to Digit Span and Word Attack (administered during the present study), variables such as Arithmetic and Coding from the WISC-III, as revealed by Strang and Casey (1994) and Symbol Search, as additionally suggested by Kaufman (1994) should be investigated. Patterns of correlations between these variables and degree of visual impairment (as found with Digit Span and Word Attack) would need to be determined and would need to be incorporated in the interpretation of patterns of strengths and deficits in ability. It would be important to determine if children with moderate visual impairment presenting with academic delays use visually mediated strategies rather than phonological processing skills when reading, a pattern observed in children with severe reading disability (Siegel, Share, & Geva, 1995). It

could prove particularly problematic for a child with more extensive visual impairment to rely on visually mediated strategies when attempting to learn to read, a learning approach that could have an impact on all areas of academic functioning.

The status of the self-esteem of the children should be further clarified by using a measure that assesses overall self-esteem independently from self-esteem in sub-domains. Harter's Self-Perception Profile for Children (1985) allows such a differentiation. Because of the complexity of the Harter scale, it should only be administered to children who have the necessary reading skills and conceptual abilities. This would mean that a number of children in both groups (without and with other handicaps) would not be able to complete the measure. However, utilizing the Harter scale would help clarify further the self-esteem and perceived peer acceptance status of the children. In addition, the administration of the Social Support Scale for Children and Adolescents (Harter, 1985) would further allow a clarification of the role that significant others play in the development of self-esteem in children with visual impairment.

The children in the present study reported a level of perceived peer acceptance lower than other areas of perceived competence. MacCuspie (1990) reported that the children she studied, with various degrees of visual



impairment, had low peer status. Using sociometric measures, it would be worthwhile to study the peer status of a larger group of children with moderate visual impairment and incorporate that information with data on perceived peer acceptance.

For the group with other handicaps, some indications of the specific type and severity of the co-morbid conditions (i.e., hormonal imbalance, cerebral palsy) would be informative. This measure could take the form of a checklist and/or rating scale to be completed by medical personnel (i.e., family doctor, nurse) or professionals (i.e., physiotherapist, speech pathologist) familiar with the child. The information obtained would allow a study of the interaction between the specific conditions, the severity of each condition, intellectual and academic performance and measures of self-esteem.

### Conclusion

In conclusion, the results of the present study provide evidence that there is a high proportion of children with moderate visual impairment (without other handicaps) who function academically below expected levels in terms of intellectual ability. Some important variables that differentiate the children who present with delays from those who do not have been identified. Additional intellectual and academic tasks will need to be further investigated so that, as in the field of learning

disabilities, the underlying difficulties can be identified and appropriate remediation can be instituted. In addition, the variables that influence perceived peer acceptance and actual popularity will need to be further elucidated so that appropriate intervention programs can be put into place if needed. The functioning of children with moderate visual impairment with other handicaps was examined and revealed great variability in performance levels. More in-depth investigations will be necessary to clarify the status of these children and the variables that significantly affect their functioning. The present study represents an important step towards clarifying the status of children with moderate visual impairment. Future studies may shed further light on the variability that exists within this population.

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## Appendix A

### Relevant WISC-R Subtests and What They Measure

(Sattler, 1992)

**Similarities:** Requires stating how two items are the same; reported to measure verbal concept formation.

**Arithmetic:** Requires the solving of math problems presented orally; reported to measure mental computation ability and concentration.

**Picture Arrangement:** Requires children to order a series of pictures to form a logical story; a measure of nonverbal reasoning ability and of visual organization skills.

**Block Design:** Requires putting blocks together to copy a model; measures the ability to perceive parts that make up a whole and requires visual organization and visual-motor skills to complete the task.

**Object Assembly:** Requires visual motor abilities as well as visual organization to put together a puzzle from parts that may not be easily recognized.

**Coding:** Requires the copying of symbols; reported to be a measure of the ability to learn a new task involving visual-motor coordination, with both speed and accuracy required.

## Appendix B

**Questionnaire: Parent**

1. Date questionnaire completed:
2. Name of identified child/adolescent:
3. Birthdate:
4. Age:
5. Sex: Male\_\_\_\_\_ Female\_\_\_\_\_
6. Name of person completing the questionnaire:  
Relationship to child:
7. Address:
8. Identified child/adolescent living with:  
Relationship to child:
9. Number of siblings:
10. Birth position of identified child/adolescent:
11. Language(s) spoken in the home:
12. Education level of father:  
mothers:
13. Occupation of father:  
mother:
14. Do other members of the family have an eye problem?  
If yes, what is (are) the diagnosis?  
If yes, what is their relationship to the identified child/adolescent?

Low vision history

15. What first led you to believe that your child/adolescent might have a visual impairment? What were the signs?

16. At what age were the visual concerns identified?
17. Are both eyes involved?
- If only one, which eye?
18. What was the diagnosis given for the visual impairment?
- By whom?
19. Has the child/adolescent had any eye operations?
- Yes\_\_\_\_\_ No\_\_\_\_\_
- If yes, to both eyes?
- To one eye? Which?
- Was one eye done before the other?
- At what age?
- How much time passed between the two operations?
- Was (were) the operation(s) considered successful?
- Any complications? (If yes, please describe.)
20. Has the identified child/adolescent been diagnosed as having other problems besides the visual impairment?
- (If yes, please specify).

### Education

21. Present school placement (grade):
22. Type of educational placement (indicate which)
- regular classroom:
- regular classroom with in class aide support:
- special learning resource programme:
23. Has the identified child/adolescent changed schools?
- If yes, in which grade(s)?



24. Has the identified child/adolescent received or is he/she receiving help from other professionals?  
If yes, please indicate which:  
speech/language therapy:  
occupational therapy:  
physiotherapy:  
other (specify):
25. Was the identified child/adolescent involved in an early intervention program?  
At home?  
How often did the child attend (if held at a centre)?  
How long did it last?
26. Did the identified child receive input from a specialist in low vision at the preschool level?
27. Is the identified child/adolescent presently receiving extra help in school?
28. Is some of the help offered by a low vision specialist (such as an itinerant teacher for the visually impaired, a low vision specialist in the school, etc.)?
29. Has the identified child/adolescent attended a specialized facility for the blind or the visually impaired: The W. Ross Macdonald School, in Brantford, Ontario, or APSEA-Resource Centre for the Blind and the Visually Impaired in Halifax, Nova Scotia?  
If yes, when and for how long?
30. Has the identified child/adolescent been given a

psychological assessment within the last 6 months?

31. Any additional information that you consider important:

## Appendix C

### Letter to Ophthalmologists and Optometrists

Dear Dr.:

I am writing to you to request your assistance in locating parents of children with moderate visual impairment so that I can seek their participation in a research project I am undertaking. I am a Ph.D. student in Child Clinical Psychology at the University of Windsor. I am presently conducting research with children and adolescents between 9 and 16 years of age who have a moderate visual impairment (20/70 up to, but not including, 20/200). This research will be used in my dissertation which deals with academic functioning and self-esteem. While people have opinions about the functioning of children with various degrees of visual impairment, only limited research has attempted to clarify the status of children with partial vision.

Before returning to graduate school in Windsor, I worked for 9 years as Preschool Consultant-Teacher at the APSEA - Resource Centre for the Visually Impaired in Halifax, Nova Scotia. My interest in the field of visual impairment and blindness has continued through graduate school and has translated itself into my dissertation research area.

Support for this study has been granted through the APSEA -

Resource Centre for the Visually Impaired and the Canadian National Institute for the Blind's Ross C. Purse Doctoral Fellowship.

I have been in contact with the Windsor district office of the CNIB, the parents' organization VIEWS, as well as a number of school boards. I am looking for a more direct route to recruiting parents and their children, particularly the ones who may not be registered with CNIB. I have already started collecting data in the Maritime Provinces, through the APSEA - Resource Centre for the Visually Impaired.

If you are prepared to assist me with this project, your involvement would be limited to having you or a member of your staff providing an invitation package to the parents of children who meet the criteria. The package would consist of an invitation to the parent(s) to participate as well as a self-addressed response card on which the parent(s) can indicate his/her interest in getting more information about the study. I have included a copy of the invitation and the response card for your perusal.

If you would like more information about my project, please do not hesitate to contact me at the University of Windsor (519-253-4232 ext. 2218; fax # 519-973-7021).

Thank you for the attention given to this matter.

Sincerely,

Anne-Marie Drapeau  
Department of Psychology  
University of Windsor  
Windsor, Ontario  
N9B 3P4

## Appendix D

### Other Group

All 9 participants were Caucasian. Information was obtained on one individual who was 17 years old by the time a visit could be scheduled. The participants presented with a variety of visual conditions and associated symptoms: one participant with optic nerve atrophy presented with exotropia and astigmatism; another with anisometropia, nystagmus, strabismus, and astigmatism; and the third with nystagmus and esotropia. The participant with high myopia also presented with esotropia. The participant with optic nerve hypoplasia demonstrated myopia and astigmatism. Two participants had been diagnosed with cortical visual impairment and both presented with esotropia. The participant with severe nystagmus also experienced high hyperopia. It should be noted that at least five participants presented with more than one co-morbid condition (e.g., the congenital cataracts of one participant were the result of having been in contact with rubella in utero and occurred in conjunction with a hearing impairment as well as congenital heart disease).

Eight of the nine children/adolescents were getting educated in regular community classrooms with in-class aide support. Five of these children spent part of the school day in special learning resource programmes. One child received her education in a class for the hearing impaired

within a regular community school. Eight of the participants were offered services by an itinerant teacher or a consultant for the visually impaired. One adolescent had been receiving such services until the end of the previous school year. Services were being discontinued because visual acuity readings were measured at better than 20/70. One of the nine children had attended the specialized school for the visually impaired (Sir Frederick Fraser School) in Halifax for 2 years before returning to a local community school.

## Appendix E

### Interview: Personal Interests and Concerns

1. What do you like? What makes you happy?
2. What do you dislike? What makes you sad?
3. If you were given one wish, anything you wanted, what would you ask for?
4. Do you feel different? If yes, why?

special? If yes, why?

5. Of the following, what do you enjoy doing?

read a book___	have someone read you a story___
play nintendo___	go to movies___
watch television___	go to school games___
talk with friends___	write your own stories
go shopping___	
go to a playground___	
play games with your brother/sister___	
play outside with others___	



## Appendix F

### PARENT CONSENT FORM

#### Study on the Child/Adolescent Population with a Moderate Visual Impairment

Purpose: The goal of this study is to obtain information on children and adolescents who have a moderate degree of visual impairment by looking at some of their strengths as well as some of the challenges that confront them. Specifically, the study will investigate the academic achievement of children and adolescents (age 9 to 16 years) who have been identified as having a visual acuity from 20/70 up to, but not including, 20/200. In addition, some indications on how the children/adolescents feel about themselves will also be obtained. To gain a more complete picture of the population, all children/adolescents with a moderate degree visual impairment will be invited to participate, whether they present with a visual impairment only or have other handicaps (cerebral palsy, seizures, etc.) in addition to the visual impairment. In turn, this increased knowledge will lead to a greater understanding of the children/adolescents with reduced vision and to a greater ability to meet their specific needs if special needs are identified.

What Participants Do: If you agree to have your child

participate in this study, he/she will first be given a distance vision screening test. Then, your child will be asked to complete a variety of tasks that will offer some indication of general level of ability, as well as standing in the academic areas of reading (decoding and comprehension), spelling, and mathematics. Another questionnaire will address how your child feels about himself/herself in general, and in the specific areas of behaviour, intelligence/school, as well as physical appearance. Your child will also be asked to answer a few questions about individual interests and concerns. The session will last approximately 2 to 2.5 hours.

While your child is completing these measures, you will be asked to complete a questionnaire about his/her visual, developmental, and academic history. The questionnaire will take approximately 20 minutes to complete.

If you agree to have your child participate, I will ask you to sign a consent form so that I may obtain a copy of your child's latest eye disorder diagnosis and visual functioning assessment report (near and distance visual acuity readings) from his/her eye specialist.

Participants's Rights: Your child's participation in this study is entirely voluntary. If for any reason you do not

wish to have your child continue participating once the study is under way, you will be free to have your child drop out at any time. You and your child's individual responses to the tasks and questionnaire for this project will be kept confidential. Your names or your child's name will never appear in any reports of this study. You may ask questions about the procedure of the study at any time and your questions will be answered.

Feedback: Once the study has been completed, you may receive a copy of the study results if you wish. Please leave your name and mailing address on the back of this form if you wish to receive a copy of the results.

I understand that this research has been cleared by the Ethics Committee of the Department of Psychology at the University of Windsor, as well as by the Board of Directors of the Atlantic Provinces Special Education Authority - Resource Centre for the Visually Impaired, Halifax, Nova Scotia, and by the Canadian National Institute for the Blind in Windsor, Ontario. Any concerns about the procedure may be reported to the Ethics Committee at the University of Windsor (Chair: Dr. Roland Engelhart, 519-253-4232, Ext. 2222), to the office of Research Services at the University of Windsor (519-253-4232, Ext. 3916), to the Superintendent of the APSEA - Resource Centre for the Visually Impaired

(Mr. Arnold Jones, 902-424-7765), or to the Director of the CNIB in Windsor (519-945-2321).

If you have any questions about you and your child participating, please feel free to contact me, or my advisor, Julie Hakim-Larson, Ph.D. (519-253-4232, Ext. 2241), at any time. Thank you for your cooperation.

Anne-Marie Drapeau, M.A.  
Department of Psychology  
University of Windsor  
(519) 253-4232, Ext. 2218

I (parent/guardian) \_\_\_\_\_ (please  
print name) have read the consent form and agree to complete  
a questionnaire as well as have my child \_\_\_\_\_  
(child's name) participate in this study.

Signed \_\_\_\_\_ Date \_\_\_\_\_

## CHILD/ADOLESCENT ASSENT FORM

### Study on the Child/Adolescent Population with Moderate Visual Impairment

Purpose: The reason I am doing this study is to obtain information on children and adolescents who have a moderate degree of visual impairment by looking at some of their strengths as well as some of their difficulties. The study will look at how children and adolescents (age 9 to 16 years) do in school and how they generally feel about themselves. This information will allow a better understanding of their needs and will reveal if extra help is needed.

What Participants Do: If you agree to participate in this study, you will first be asked to complete a simple test that will measure your distance vision. You will then be asked to do a number of tasks that will measure what you know, what you are able to do, as well as how you are doing in school subjects (reading, spelling, and mathematics). You will also be asked to answer questions related to how you feel about yourself. I will then ask you some general questions about what you are interested in and about any concerns you might have. The session will last approximately 2 to 2.5 hours.

Participants' Rights: Your participation is entirely up to you. If for any reason you do not wish to continue participating once the study has started, you will be free to stop at any time. What you say or how well you do during this project will be kept confidential. Your name will never appear in any reports of this study. You may ask questions about what we are doing in this study at any time and your questions will be answered.

If you have any questions about participating, please feel free to contact me or my advisor, Julie Hakim-Larson, Ph.D. (519-253-4232, Ext. 2241), at any time. Thank you for your cooperation.

Anne-Marie Drapeau, M.A.  
University of Windsor  
Department of Psychology  
(519) 253-4232, Ext. 2218

I, \_\_\_\_\_ (please print name),  
have read this assent form and agree to participate in this  
study.

Signed \_\_\_\_\_ Date \_\_\_\_\_

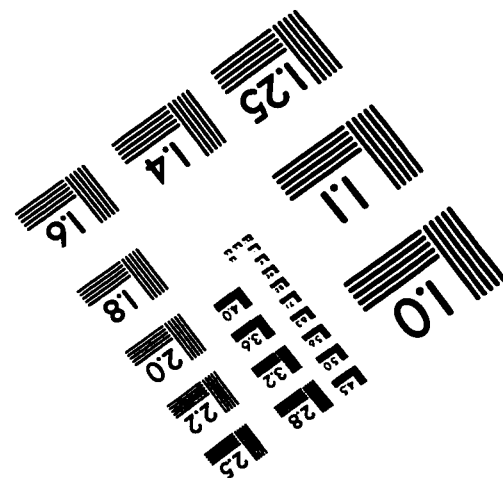
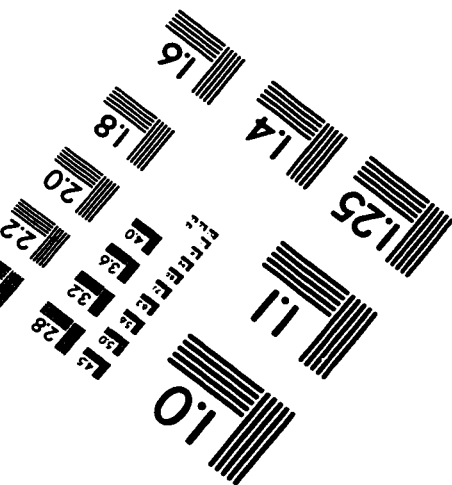
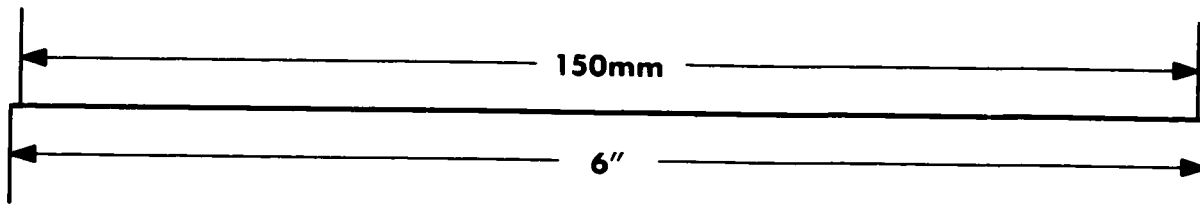
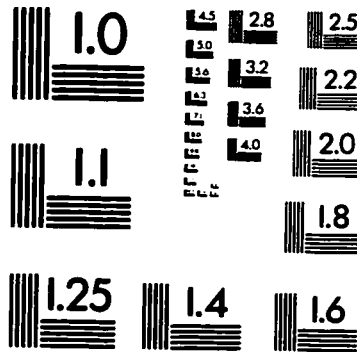
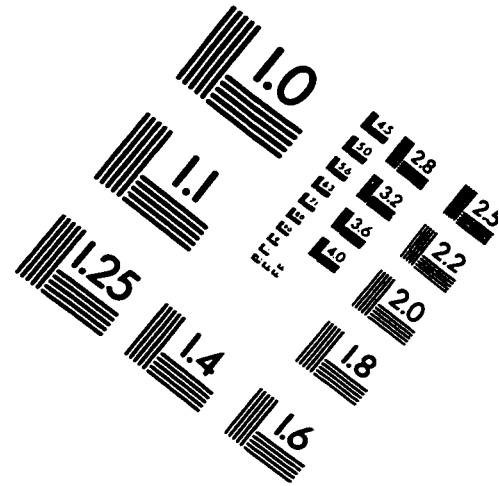
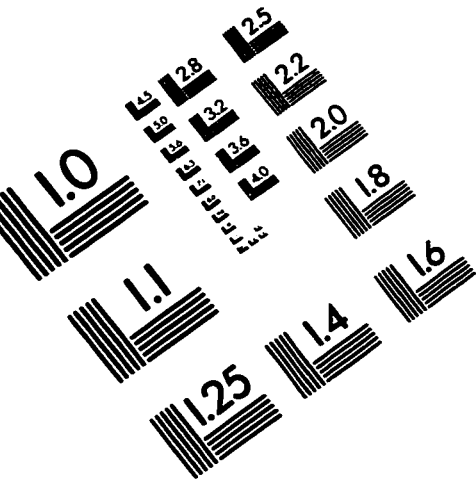
## VITA AUCTORIS

Anne-Marie Drapeau was born November 29, 1950, to Armand and Thérèse Drapeau, in Campbellton, New Brunswick. She graduated from the Ecole Secondaire Vanier in Moncton, N.B. in 1968.

Anne-Marie obtained a B.A. (1972) and an M.A. (1977) from the Université de Moncton. From 1974 to 1980, she worked in the Psychology Department of the Dr. Roberts Hospital-School for Children in St. John, N.B. In 1980, she moved to Halifax, Nova Scotia, to work at the APSEA-Resource Centre for the Visually Impaired as Preschool Consultant-Teacher. She remained at the Centre until 1990, taking a one-year sabbatical in 1985, to obtain additional training at the Association Montessori International school in London, England.

In 1990, she enrolled in the Doctoral program in Child Clinical Psychology at the University of Windsor, Ontario. At the completion of her degree, she is returning to her native New Brunswick to work with children and their families.

# IMAGE EVALUATION TEST TARGET (QA-3)



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